Electric Railway Journal

A CONSOLIDATION OF STREET RAILWAY JOURNAL AND ELECTRIC RAILWAY REVIEW

Vol. XXXIX NEW YORK, SATURDAY, MARCH 9, 1912 No. 10

PUBLISHED WEEKLY BY

McGraw Publishing Company

JAMES H. McGRAW, Pres. C. E. WHITTLESEY Sec'y and Treas.

239 West 39th Street, New York

TELEPHONE CALL: 4700 BRYANT. CABLE ADDRESS: STRYJOURN, NEW YORK

CHICAGO OFFICE.....1570 Old Colony Building
CLEVELAND OFFICE.....1021 Schofield Building
PHILADELPHIA OFFICE.....Real Estate Trust Building
EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

TERMS OF SUBSCRIPTION

For 52 weekly issues, and daily convention issues published from time to time in New York City or elsewhere: United States, Cuba and Mexico, $3.00 per year; Canada, $4.50 per year; all other countries, $6.00 per year. Single copies, 10 cents. Foreign subscriptions may be sent to our European office.

Requests for changes of address should be made one week in advance, giving *old* as well as new address. Date on wrapper indicates the month at the end of which subscription expires.

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to Wednesday, 9 a. m., of the week of issue.

Copyright, 1912, by McGRAW PUBLISHING COMPANY
Entered as second-class matter at the post office at New York, N. Y.

Of this issue of the ELECTRIC RAILWAY JOURNAL, 8000 *copies are printed.*

NEW YORK, SATURDAY, MARCH 9, 1912

CONTENTS

Return of Money to Passenger..... 379
Power Plant Data..... 379
Students as Conductors..... 380
Boiler Operation in Carhouses..... 380
Track Drainage..... 381
Lost Motion in Maintenance Work..... 381
New Indianapolis Power Station..... 382
Hearing on Terminal Electrification at Boston..... 389
Proposed Trip of Executive Officers A. E. R. A..... 390
Coping with Snow in Boston..... 391
Psychological Tests for Accident Prevention..... 394
Students as Conductors on Denver Trail Cars..... 395
Chicago Council Committee Recommends Improvement in Service During Rush Hours..... 396
Motor Pinions..... 397
Milo R. Maltbie on Judicial Review of Regulative Commissions..... 398
New Power Station of Charleston Consolidated Railway & Lighting Company..... 398
Porcelain-Glazed Metal Stirrup for Passenger Straps..... 399
Shop Talks on Maintenance..... 399
Testing Seamless Cold-Drawn Trolley Poles..... 399
New Combination for Gary & Southern Traction Company..... 400
The Lohmann Process of Coating by Lead..... 400
News of Electric Railways..... 401
Financial and Corporate..... 404
Traffic and Transportation..... 407
Personal Mention..... 409
Construction News..... 410
Manufactures and Supplies..... 413

RETURN OF MONEY TO PASSENGER

In the use of fare boxes one cause of possible friction with the public may be minimized by care and consideration on the part of the railway. No matter what precautions are taken by conductors, it appears to be impossible to prevent passengers from occasionally dropping in the box a coin larger than the amount of fare for the one or more persons for whom payment is to be made. With the fare box locked the conductor is powerless to return the change expected and due in such cases. The plan adopted by some companies for effecting a return of the change under these circumstances is based on the deposit of a slip of paper by the conductor giving the name of the passenger and the value of the coin which it is claimed was placed in the box. A similar slip of identification may be given to the passenger and presented by him after the lapse of a day or two at the office of the company. If the records kept at the office show that the large coin was found in the box, the proper change is returned. This plan, of course, is intended primarily to safeguard the revenues of the company and prevent the payment of money on false claims. It appears to accomplish this end satisfactorily. However, it is open to the criticism that it causes inconvenience to the person who was guilty merely of ignorance in dropping the large coin in the fare box. The only way in which the return of the money can be secured is by a visit to the railway office, which takes more time than the average person likes to give. An easier way to effect the return of money, so far as the passenger is concerned, would be by check, even though the amount is very small. This would be an evidence to the person who made the mistake that the company was anxious to rectify the error and, in doing so, to discommode a patron as little as possible. It would "please the public."

POWER PLANT DATA

If engineers occupied in power plant operation realized more generally the value of maintaining accurate and responsive data concerning the details of the equipment under their charge, the practice of using loose-leaf or other flexible methods in this connection would be more common. There is nothing new in this idea, of course, but visits to many plants furnish convincing evidence that the benefits of the practice are not widely appreciated, at least in many installations of small or moderate capacity. These are just the ones where it is easiest to maintain a live file of statistics of machine sizes, speeds of main units and auxiliaries, sizes of supply and discharge pipes, pump cylinder dimensions and the rating of electrical apparatus, heating and grate surface of boilers, number and size of tubes, height and diameter of breeching or stack dimensions, and the numerous similar data which can be obtained so quickly from an up-to-date notebook. In the large stations the value of this information is usually realized by the engineers in charge. It saves a good deal of time in dealing with the purchasing department or in answering emergency questions which arise without warning at conferences and hearings. It also helps to keep alive a keener interest in the plant structure as a personality throbbing

with energy, and indirectly, at any rate, fosters more accurate service. All the details required may be on name plates and in the files of the engineering department, but if the essential facts of equipment are "salted down" in this way the time of high-priced men is saved in not a few instances every year. One company has adopted the practice of tabulating graphically this information, not only as regards its own power station but for some other stations of about the same size. These charts enable an engineer to follow by a glance the progress of coal from the barges to the furnaces, of the feed-water from its entrance into the power station to the boilers, and of the steam from the boilers to the condenser. Charts of this kind, when hung up in the power station with general plans of the power station piping, are of great help to the force and contribute to the welfare of the service as at least a minor source of economy.

STUDENTS AS CONDUCTORS

An article published in a recent number of the *Bulletin* issued by the Denver Tramway Company explains the success which this company has had in meeting the needs of rush-hour traffic by the use of trail cars manned by student conductors. The term "student conductors" in this instance means young men who are working their way through the Denver University or the high schools and are glad of an opportunity to make a little money by giving part of their time each day to railway service. The conditions under which the young men are able to do this work are, of course, unusual, and it is fortunate for them as well as to the advantage of the company that the arrangement can be perfected so satisfactorily. Mr. Beeler directs attention to the fact that the regular trainmen find that this practice makes it possible for them to get time off more easily than before. The work of the conductor on a trail car during the rush-hour period does not require the same experience that would be needed ordinarily for service on a motor car, and for that reason the extra temporary men can be employed because of the safeguard afforded by the presence of a trained man on the forward car. The difficulty of obtaining trained men for a period of only three or four hours in the day is one of the serious drawbacks in street railway operation. If the average man uses part of his time in that way, it is not easy for him to find permanent work during the rest of the day. The students are not under the same necessity. They can continue their studies and yet make a little money toward their expenses by such an arrangement of their hours as will meet the need of increased railway service during the limited rush periods. Students have been employed as trainmen in other cities, particularly during the summer season. Many roads in the Eastern States have a large summer business, and students during their vacation hours do good service there, both as motormen and conductors. As conductors they are polite and of good appearance, and as motormen they usually have a knowledge of electrical mechanics which serves them in good stead. The common fear that young men in temporary employment of this kind will not take the work seriously enough has not been borne out, we believe, in the majority of cases. The Denver example is one which might be followed elsewhere.

BOILER OPERATION IN CARHOUSES

The extension of service into residential areas leads naturally to the establishment of carhouses on the outlying portions of street railway systems, and the maintenance of good operating conditions with respect to different neighborhoods includes strict attention to the smoke problem. With the gradual disappearance of scattered power stations the opportunities to heat carhouses from the boiler batteries supplying the generating equipment are growing less year by year, and in most cases a local heating plant is necessary. Offices, pits, paint shops and other sections where careful and relatively expensive maintenance work is directed or carried on must be heated sufficiently to insure the reasonable comfort of employees, and in northern climates low-pressure steam service is almost universally employed. With the greatest care in operation there is bound to be a large loss of heat in carhouse operation, and it is the part of good management to keep as close a watch upon the performance of the heating system as is maintained upon the use of similar equipment in the power stations. Regular records of the amount of coal used, the weight or volume of ashes discharged, time spent in the boiler room, condition of the distributing system, repairs needed and weather and temperature variations should be prepared and scrutinized, with the object of minimizing the waste of fuel and labor, since these may run into substantial totals in the course of a single winter on a system having a considerable number of carhouses. Thermometers are cheap and serve a good purpose in any part of the house in close relation to the heating system.

Aside from the careful design of the heating system, including the arrangement of proper facilities for handling condensation and drainage, the consideration of separating repair sections from storage divisions in the interests of heat economy, and the installation of sectionalizing valves and a gravity system of coal delivery, with mechanical ash handling where possible, the matter of smoke prevention is often of first consequence. Careless firing, unfavorable draft conditions, short stacks, leaks in boiler settings and other difficulties often beset the carhouse foreman. The handling of the heating system lacks interest as a job and tends to become rather perfunctory. Here is a chance for betterment work by the engineering department in the interests both of smoke reduction and of low operating costs.

Considerable success has lately attended the use of cheap fuels, with forced draft supplied by a small motor-driven blower for meeting carhouse conditions. In one case coke breeze is being thoroughly tried out, the local smoke law being highly restrictive. This fuel consists of the fine particles of coke which could not ordinarily be burned in a house furnace, blowers being required to force sufficient air through the fuel bed. Success in the use of this fuel demands careful adjustment of the draft as indicated when a piece of cloth in front of the furnace door hangs motionless, the stoppage of leaks in the setting and doors, frequent cleaning of the fire and enough leveling of the fire to enable the holes to be filled. Adjustment of the mechanical draft and occasional mixing of soft coal with the cheaper fuel are also necessary where the stacks are

short. The subject is one which could well be considered and settled at this time of the year before the necessity of carhouse heating has been forgotten in the rush of preparations for the summer. If plans for taking care of this problem are not concluded now, they should at least be thought out in a preliminary way by the management so that any apparatus necessary can be ordered and put in service before next winter, when it will be needed.

TRACK DRAINAGE

The question of proper drainage facilities for a roadbed, both in the streets and in earth cuts on private right-of-way, is worthy of considerable attention. Engineers on both steam and electric roads are studying this problem and are expending large sums of money in its solution. The methods devised are interesting and instructive. Proper drainage is vital to a first-class roadbed, and the track maintenance is materially increased if drainage does not receive detailed attention.

Probably 75 per cent of the smaller railways fail to consider drainage carefully, and as a result in the freezing and thawing weather during the fall and spring of the year the track gets badly out of line and surface. The paving around the rails in the street heaves in some places and in others ruts are formed. It is practically impossible to accomplish satisfactory results from a maintenance standpoint when these conditions exist, as the ground is either frozen solid or too soft to work properly. Many miles of first-class track have been ruined, and the only remedy for the condition is to renew the ballast. This is expensive and would be unnecessary if the drainage had received proper attention during construction.

There is but one answer to the question of preparing track for the winter, and that is to provide proper drainage. Many roads have excavated their cuts with a wide roadbed and one and one-half to one side slopes. They provided what appeared to be ample ditches, only to find them filled level full with earth washed from the slopes after a season of heavy rainfall. It has been the practice with some to require their section forces or a ditching outfit to re-excavate the ditches each year and continue to do so until the banks become covered with blue grass or vegetation of some character. To a certain extent this method solves their problem, but when surface drainage is poor the only solution is to lay ordinary farm drain tile of proper size to take care of the water and provide sufficient fall and outlet. This assures a comparatively dry roadbed at all times, even though the ditches have filled with earth. The cost of the tile and labor is small, and the results have proved entirely satisfactory.

This same method could be used and is employed by some railways in the city streets. There is no doubt that the trench which it is necessary to excavate below the street subgrade provides drainage for a considerable distance either side of it. If there is no drainage the water must stand in the trench until it is carried away naturally. While it remains the roadbed is unstable; freezing and thawing causes the pavement to heave, and the bad track which results is almost impossible to repair during the winter months.

LOST MOTION IN MAINTENANCE WORK

As long as street railway operation continues to be a matter of almost infinite detail there will be opportunities for lost motion of various kinds to creep into the transportation machine. And this is exactly why the work is so interesting to every man in the maintenance department who cultivates a keen eye for defective practice, coupled with an equal readiness to suggest something better. From the point of view of the layman, it looks as though modern car equipment had reached such a high stage of development that it would be difficult to suggest improvement, but all along the line of actual service one finds loose ends of operation, points which experience shows may be taken care of better in the future and methods representing something a little below the best which the trained executive believes can be realized.

Closer co-operation between the shop and the carhouse points the way toward marked gains in efficiency, to take a single example. The shop superintendent who follows the equipment closely as it comes and goes learns more about the way it is operated than is often realized. He sees where some of these trips might be saved. Thus, on a road using a large number of single-motor cars, it was found that the rheostats were usually sent into the shop to be fitted with a new starting plate or blow-out coil. But when the carhouses were supplied with the new starting plates and extra coils, costing nominal sums, and the foremen were shown how to remove the old plates and coils and substitute the new parts, a good deal of labor and expense were saved. Again, where the operating department fails to send in a bent or broken part with a headlight or circuit breaker which has fallen by the wayside, the shop force is obliged to supply new parts, perhaps out of stock, at considerable cost, where if the part had been returned it might have been possible to repair it with comparative ease and with application to the storeroom. In other words, the judgment of the shop is better than that of the operating organization concerning the fitness of any injured piece for later service after due repairs. Another point is the loss of detail parts, such as caps of governors, which cost relatively large sums to duplicate. Fittings may work loose and fall upon the street, and this trouble cannot be entirely cured; but wherever a part might be returned and is not the company loses even the scrap value of the fitting.

In view of the fact that many of the carhouse employees and even many of the shop men do not realize the cost of minor fittings, we believe that it would frequently be an excellent plan to provide an exhibit for their education. This exhibit would consist of a collection of the small fittings which often get loose and become lost, or sometimes perhaps are thrown away because they are not considered of any value. Beside each fitting should be placed a card or tag showing the exact equivalent of the part in nickels. This would impress upon the men the fact that when they thoughtlessly thow away or omit to return some small appliance the company is losing through their carelessness the return from ten, twenty or more passengers. A constant study of service conditions and maintenance problems in this way is bound to bring its reward.

New Indianapolis Power Station

The Ultimate Capacity Is 48,000 kw—The Equipment is Unusually Complete in Detail

The Terre Haute, Indianapolis & Eastern Traction Company has just completed a new generating station which will supply electrical energy for high-tension transmission to interurban substations and to substations of the Indianapolis Traction & Terminal Company. The ultimate capacity of the new station has been planned for 48,000 kw normal rating, to be made up of eight 6000-kw steam turbine units, of which two have been installed. The present building has floor space for two additional units of like dimensions and circulating-water facilities are now provided for the 48,000-kw capacity.

The older Indianapolis plant has been enlarged during the past few years to such an extent that any additional large increase in generating capacity would have been more expensive to obtain than has been the construction of the new plant. Especially is this so since the old plant is equipped largely with d.c. generating machinery and now occupies very valuable real estate.

The new power station is 2 miles west of the business district of Indianapolis and has been built on a plot of ground 8.45 acres in extent located at the intersection of West Tenth Street and the White River. The right-of-way of the Indianapolis Belt Railway passes through the power station property, and thus it is possible to obtain coal with equal facility from any of the many steam coal carriers entering the Indianapolis district. Choice of the location for the new power station was controlled by the excellent coal facilities and the condensing-water supply, which at this location is the best obtainable in or near Indianapolis.

The power station property is just below the confluence of Fall Creek and White River. A location farther upstream would have reduced considerably the amount of circulating water which now can be relied upon. A location farther downstream would have been open to two criticisms: First, some other large plant might be located just above the new station and thus the temperature of the circulating water might be considerably increased; second, a number of packing houses and private abattoirs discharge their drainage systems into the river and thus contaminate the water below the chosen location. The site of the new station is such that high-tension transmission lines may be led directly away from it to serve the interurban roads, yet the station is only 1 mile distant from the old station supplying the d.c. load. The d.c. switchboards of the two stations are tied together and the d.c. energy from the new station is distributed to trolley feeders from the switchboard of the old station.

GENERAL STATION ARRANGEMENT

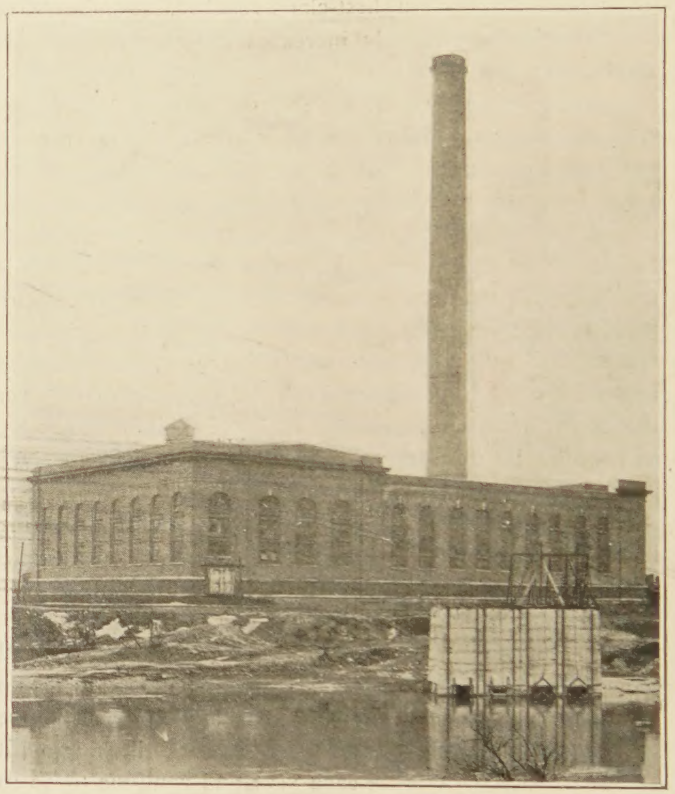
In constructing the new station the possible need for quadrupling the generating capacity now installed received full recognition. The general arrangement of the ultimate station, which will house eight 6000-kw horizontal turbines, contemplates a turbine room and electrical gallery both of which will be 320 ft. long in the final development of the plant. At present only half of this portion of the building is constructed.

The boiler plant will be housed in three sections, each inclosing two rows of boilers with their firing aisles at right angles to the center line of the turbine room. A single brick stack serves the ten batteries of boilers in each of the three boiler house sections, one section of which is now in operation. The coal-handling equipment is at the end of the boiler house section opposite the turbine room.

The unit system of design has been followed in laying out this plant, Each boiler house section has its coal-handling facilities and boiler auxiliaries complete. The electrical connections are carried in straight lines or nearly so, from the turbines to bus sections in the electrical galleries and thence out to the overhead or underground transmission systems. Practically the only energy which "doubles in its tracks" is that taken from the generator buses through transformers to drive the rotary converters on the turbine room floor. The electrical features, particularly with regard to switch gear and transformer equipment, are unusually simple in this station by reason of the use of 13,200-volt generators which feed directly into the local transmission system.

BUILDING CONSTRUCTION

The new power station building consists of a turbine room 72 ft. wide by 160 ft. long, an electrical gallery section 22 ft. wide parallel with the turbine room and of the same length, and the boiler house, 118 ft. wide by 190 ft. long, at right angles to the turbine room. The superstructure is of steel-frame construction designed to care for the wind stresses, roof and crane supports. It is inclosed with fireproof brick on three sides. The fourth side of the turbine room is temporarily protected with corrugated iron. The building walls are trimmed with Bedford stone and rest on a massive concrete structure forming a basement 22 ft. deep. The foundations and basement floor are slabs of concrete 3 ft. thick and reinforced both ways with ¾-in. and 1-in. rods placed near the upper surface of the floor to provide for the upward pressures that might be due to a hydrostatic head of approximately 25 ft. during freshets. A railroad embankment between the nearby river and the new station ordinarily will prevent flood water from reaching the foundation walls, but the concrete work of the power station substructure was designed to withstand a maximum head that might be developed and was waterproofed throughout.



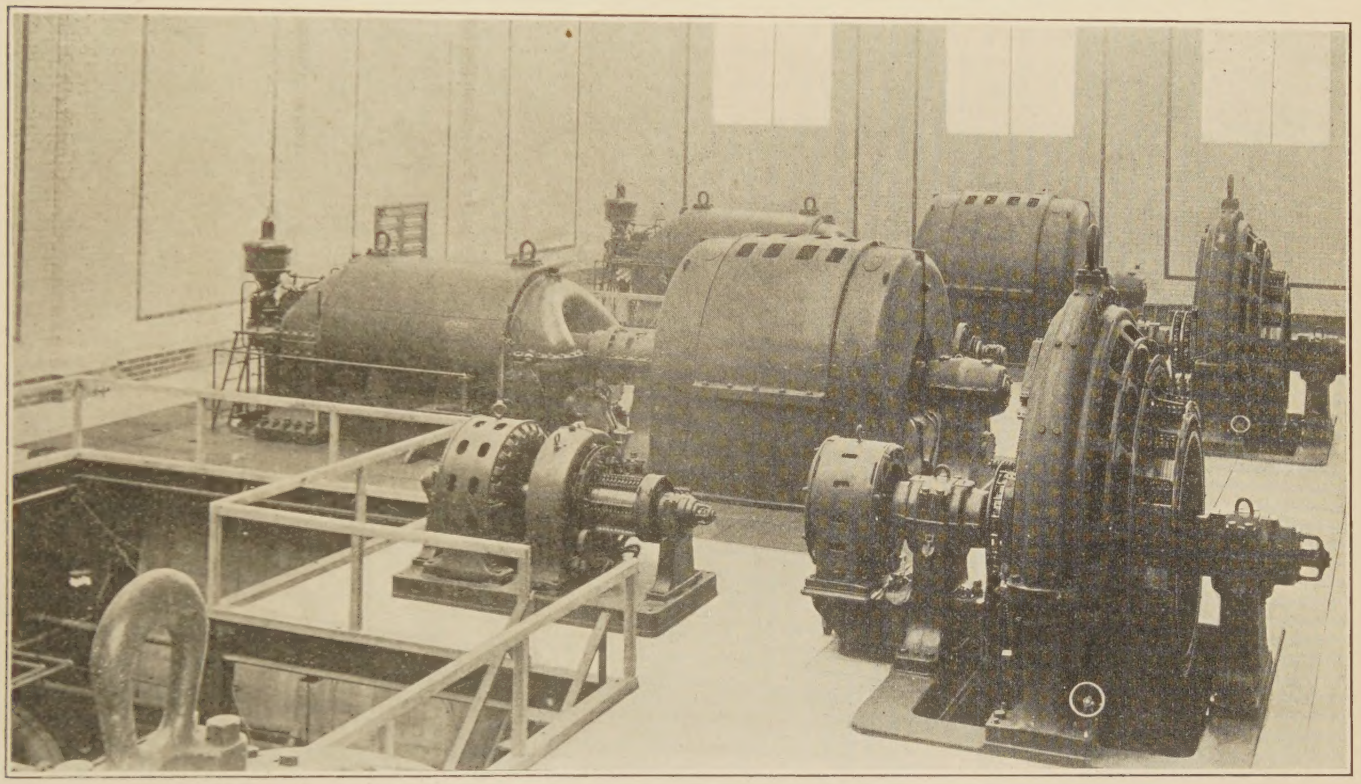
Indianapolis Power Station—East and South Elevations

A 20-ft. layer of graded gravel underlies the foundation slabs, and in the estimates a foundation loading of 5 tons

per square foot was used as a maximum. Grillages of I-beams and reinforcing bars were employed wherever it was necessary to spread the concentrated loads. About one-half of the 12,000 yd. of concrete placed was made with gravel taken from the foundation and basement excavation.

The turbines and rotary converters have concrete-pedestal foundations 22 ft. high, these foundations having been cored out to provide space above the basement floor for auxiliary equipment. As will be noted from the cross-sectional view of the turbine room, the foundations for the turbo-generators rest for about three-fourths of their length on the roof of the circulating-water tunnels.

The roof of the turbine room is supported by bowed trusses 10 ft. deep at the sides, 9 ft. deep at the center and spaced 20 ft. apart throughout the length of the building. The trusses carry continuous I-beam purlins and a Ferroinclave roof covered with five-ply tar and gravel. The roof structure was designed for a live loading of 60 lb. per square foot. The dead loading included tar and gravel, 6 lb. per square foot, and Ferroinclave with concrete 20 lb. per square foot. A row of monitor skylights surmounts the center of the turbine room roof.



Indianapolis Power Station—View of Turbine Room from Switchboard Balcony, Showing Nos. 1 and 2 Turbines, Nos. 1 and 2 Rotaries and Motor-Driven Exciters

The interior walls of the turbine room are finished in white-enameled brick paneled with lines of green-enameled brick and having a wainscoting of green brick. The use of the white brick walls and large window openings with Fenestra steel sash affords a turbine room with exceptionally generous natural illumination. The entire turbine room is served by a 50-ton, three-motor Niles crane.

In general the construction materials in the electrical galleries are similar to those used throughout the other parts of the station. All are incombustible, consisting largely of steel, concrete, enameled brick, copper-sheathed doors and Fenestra steel window sash. The general type of construction of one section of the boiler room is shown by the accompanying sectional elevation.

LARGE STACK

The present installation of boilers is served by a Heinecke radial brick stack, 320 ft. 6 in. high and 18 ft. in clear diameter at the top. This stack extends 22 ft. below the turbine room floor. It was built in 110 working days. The base of the stack rests on a concrete slab 8 ft. deep by 48 ft. square, and reinforced both ways, 6 in. from the bottom, with 1-in. rods which care for the 2-ton per square foot distributed load. This load may be increased to 4 tons by wind pressure. Six columns supporting part of the boiler house structure also rest on the stack foundation, and their load is distributed by grillages of 10-in. and 12-in. I-beams placed under the column footings.

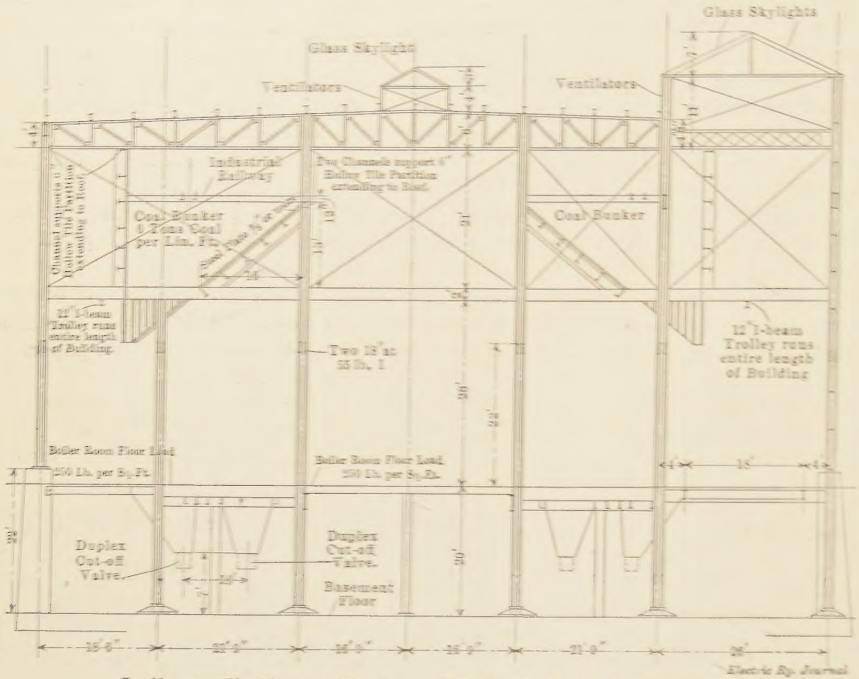
Practically all of the concrete work in this station below the level of the turbine room floor is reinforced against surface temperature cracks with American Steel & Wire Company triangular-mesh reinforcement. The concrete was made of a mixture of one part cement and seven parts gravel, machine mixed and distributed from an elevator tower by means of gravity chutes. The side and slab foundations were waterproofed with four-ply tar and paper.

CIRCULATING WATER SUPPLY

The circulating water is collected in a well on the bank of the White River and led 420 ft. to the east wall of the power station and thence parallel with the north wall of the turbine room basement for the full length of the station. This location places the suction and discharge tunnels under the steam ends of the turbines. The roofs of the tunnels are 25 ft. below the level of the turbine bases and the condenser equipment is located directly under the turbines with the pumps at one side of the foundation. Thus unusually short connections are obtained between the turbines, condensers, circulating pumps and intake and discharge tunnels.

The circulating-water tunnels are designed to furnish cooling water for condensers handling the steam from a total turbo-generator capacity of 48,000 kw with velocities in the tunnels of about 80 ft. per minute. There are four rectangular-shaped tunnels each 6 ft. wide by 12 ft. high in the clear, inclosed by concrete walls, floors and coverings 24 in. and 36 in. thick, reinforced with ¾-in. rods 4 in. center to center placed 2½ in. from the inner and outer surfaces. The reinforcement in the roof of the circulating-water tunnels where they pass under the turbine foundations is made with 10-in. I-beams on 12-in. centers. Each of the four circulating-water tunnels is continuous from

the well on the river bank to the far end of the turbine room basement. The structure is designed to withstand the hydrostatic pressures developed when one-half of it is empty and the river at the flood level. The construction of this circulating-water system included the placing of 3100 yd. of concrete. The concrete in the circulating water



Indianapolis Power Station—Steel Work of Boiler Room

structures was mixed in the proportions of one part Portland cement to five parts of local gravel.

Water is led into the intake tunnel through duplicate sets of screens held in metal grooves and housed in a concrete well 37 ft. deep and 22 ft. square in section. An adjacent well of like size is used for the discharge outlet. Wooden gates are provided for closing the openings between the wells and the river so that the wells may be pumped dry for cleaning. A 100-ft. section of 3-in. wooden sheet piling extends downstream from the corner of the discharge well and thus provides against the warm water being recirculated.

COAL AND ASH HANDLING PLANT

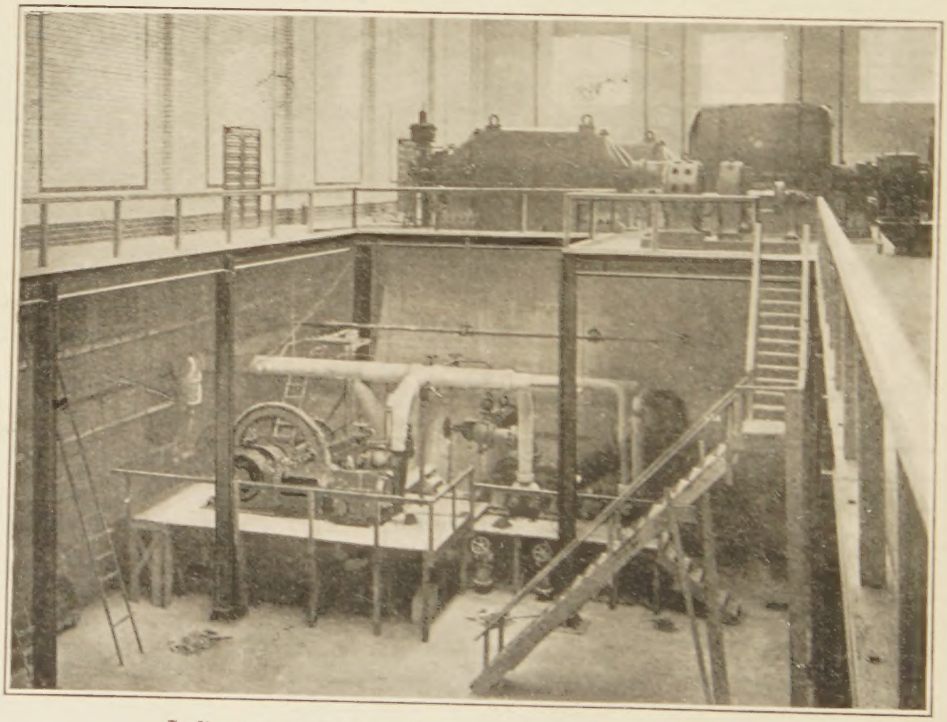
Coal is received at the north end of the station and cars are spotted by an electric locomotive which handles them between the steam railway belt line and the coal dock adjacent to the boiler house. The coal dock is a reinforced-concrete and plate-girder box open at the top and surmounted by the delivery tracks. Coal is discharged into this receiver. Thence it passes by gravity into a concrete bunker and thence through motor-driven crushers to receiving hoppers. From the receiving hoppers coal is loaded by gravity into the cars of an industrial railway by which it is delivered to the bunkers over the boilers. This railway also serves for removing the ashes and placing them in storage hoppers built above the receiving coal tracks so that the ashes may be loaded by gravity into cars for removal.

An important feature of the coal-handling plant is the elevator equipment, which consists of two Kestner & Hecht motor-operated elevators used for lifting the loaded industrial railway cars from the receiving pit to the system of distribution tracks leading to the bunkers over the boiler fronts and for raising the loaded ash cars from the basement level to the unloading tracks over the ash collection hoppers. These elevators are in duplicate, but one elevator only is required for the present equipment. The industrial railway system was furnished by the C. W. Hunt Company. In connection with the receiving and storage bunkers it furnishes an economical means for handling coal and ashes, and its capacity can quickly be enlarged or reduced according to the requirements of the station load.

The coal dock leading to the receiving hoppers provides outdoor storage for 10,000 tons of coal and the steel-plate bunkers over the boilers provide immediate storage for 6 tons of coal per linear foot, or 120 tons above each boiler. Accompanying engravings show the location and shape of the coal bunkers and the cinder and ash pits.

BOILER PLANT

Twelve 520-hp B. & W. boilers, designed for 200-lb. pressure and 100 deg. superheat, have been installed to furnish steam for the two 6000-kw units. Space is available in the present boiler house section for eight additional units of like design. A single large stack earlier described furnishes draft for the present boiler equipment and for the eight boilers later to be installed in the first boiler house section. This stack creates ample natural draft for the fires and no mechanical means



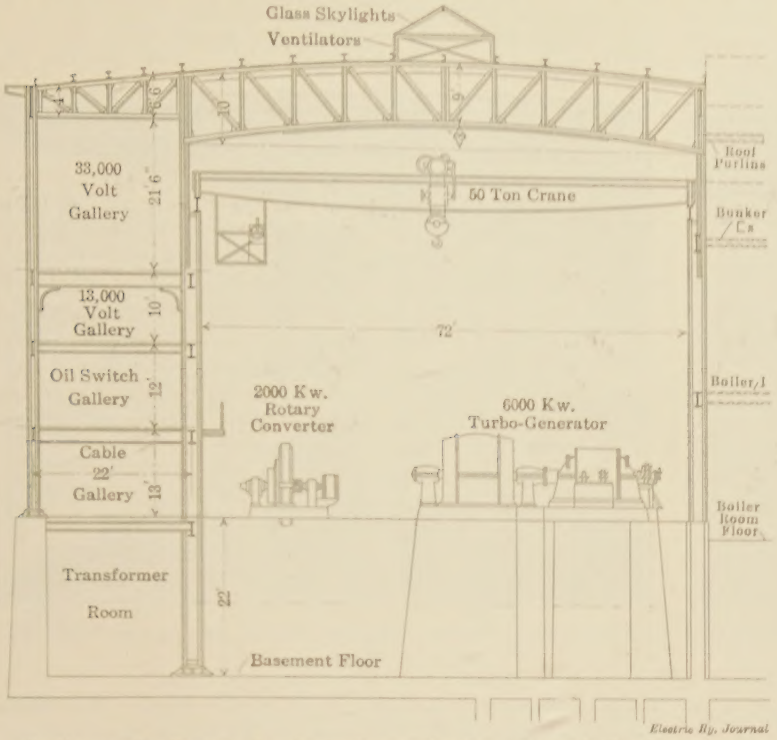
Indianapolis Power Station—Pit Under Turbines

to reinforce it will be used. Each boiler has been equipped with an Ellison differential draft gage.

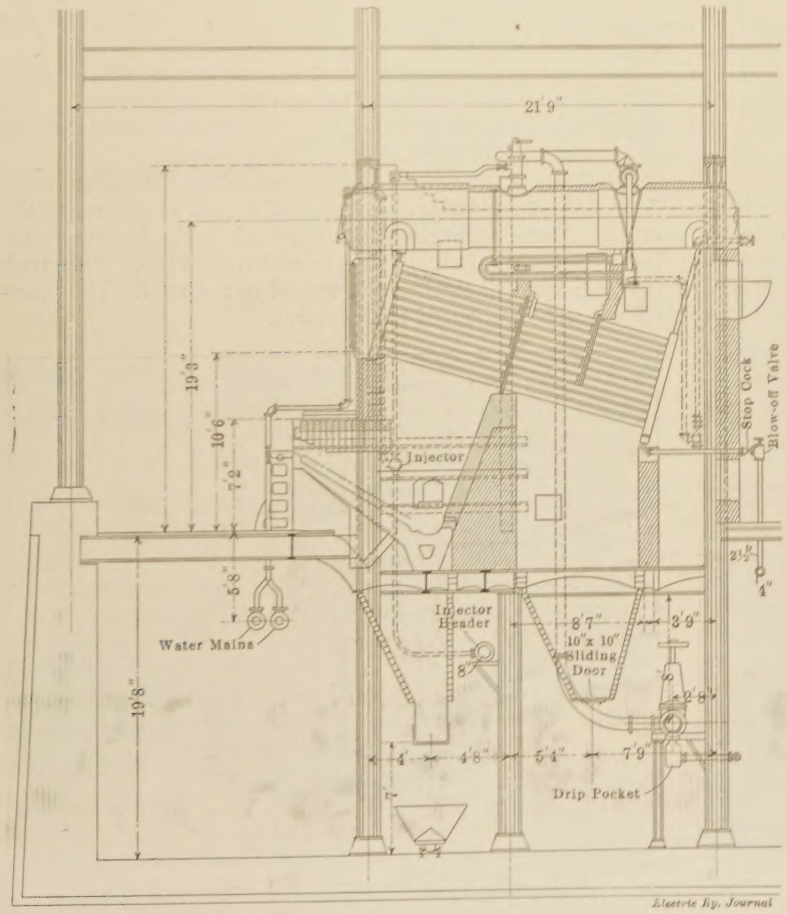
The type of boiler setting is illustrated. Particular care has been taken in connection with this installation to reduce the smoke to a minimum. The boilers are equipped

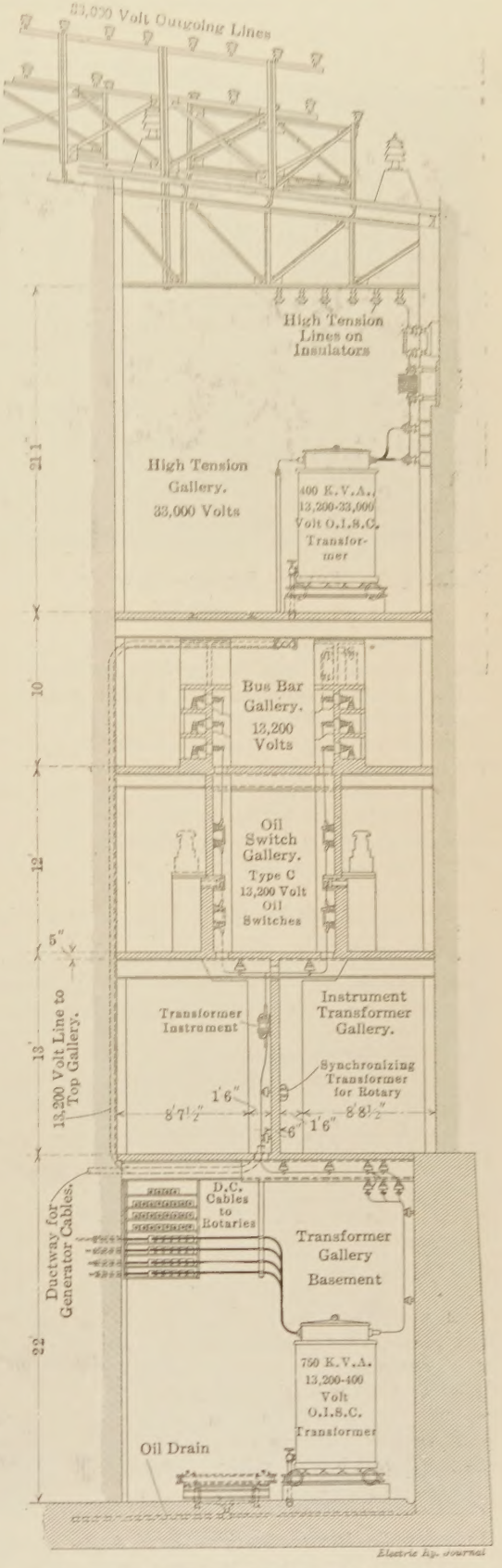
with Roney automatic stokers, with their fronts set 4 ft. 6 in. in front of the boiler wall. The boiler tubes have been placed especially high. The lower tubes are 10 ft. 6 in. above the boiler house floor and thus an especially large combustion chamber is obtained. The length of flame from Indiana coal existing under ordinary conditions of operation was carefully considered in making up the arrangement, and in view of the attention paid to the matter it is to be expected that a considerable reduction in smoke will be effected. It is also believed that the high boiler setting will result in marked furnace economies.

Feed water is obtained from a Cochrane heater supplied



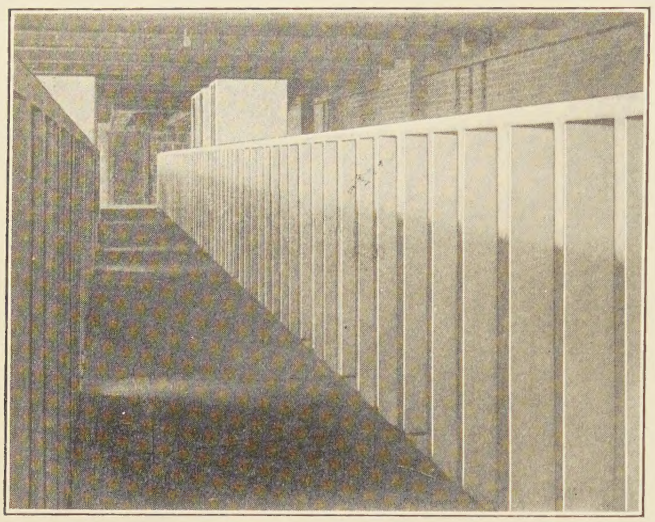
Indianapolis Power Station—Cross Section through Turbine Room



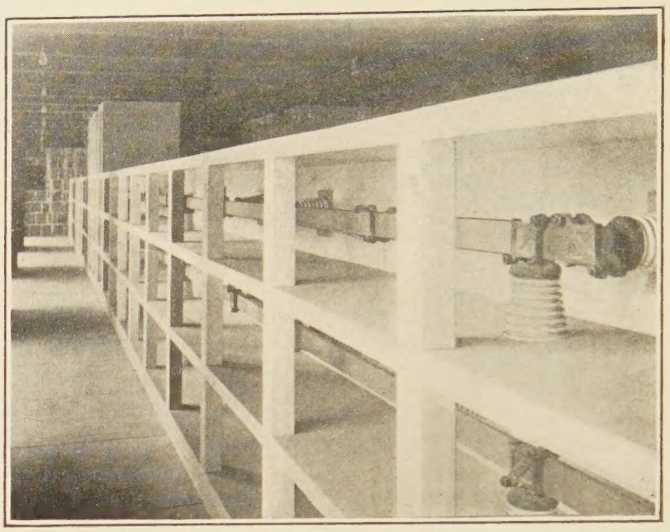

33,000 Volt Outgoing Lines
High Tension Lines on Insulators
High Tension Gallery. 33,000 Volts
400 K.V.A. 13,200-33,000 Volt O.I.S.C. Transformer
Bus Bar Gallery. 13,200 Volts
Oil Switch Gallery. Type C 13,200 Volt Oil Switches
Transformer Instrument
Instrument Transformer Gallery.
Synchronizing Transformer for Rotary
13,200 Volt Line to Top Gallery.
Ductway for Generator Cables.
D.C. Cables to Rotaries
Transformer Gallery Basement
750 K.V.A. 13,200-400 Volt O.I.S.C. Transformer
Oil Drain
Electric Ry. Journal

Indianapolis Power Station—Cross Section through Boiler—Cross Section through Galleries Showing Wiring for No. 3 Rotary

with make-up water taken from the river. The hot-well pumps are motor-driven. The boiler feed line is laid out on the loop system and consists of steel pipe with cast-steel fittings. This boiler feed line is in duplicate from the pumps to the boilers and the two lines are cross-connected at both ends. The boiler feed pumps and house pumps are in duplicate. They are of the outside-packed plunger type manufactured by Dean Brothers, of Indianapolis.



Indianapolis Power Station—View in 13,000-Volt Bus Gallery



Indianapolis Power Station—View of 13,000-Volt Bus Structure

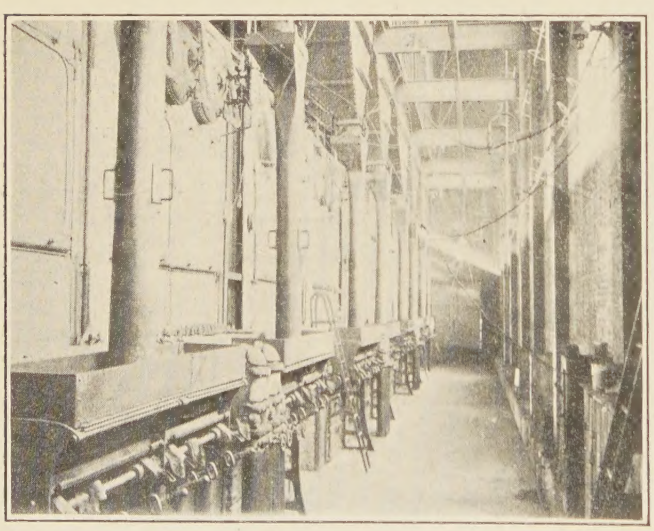
Each boiler is equipped with a Metropolitan injector designed to feed sufficient water to the boiler for operating it at its full capacity. Water is supplied to the injector from the house mains which are fed by an elevated tank located outside of the station. Once each week the injectors are used for filling the boilers so that it may be known whether they are always in operating condition. The boilers in the new plant were erected by the railway company's forces.

PIPING

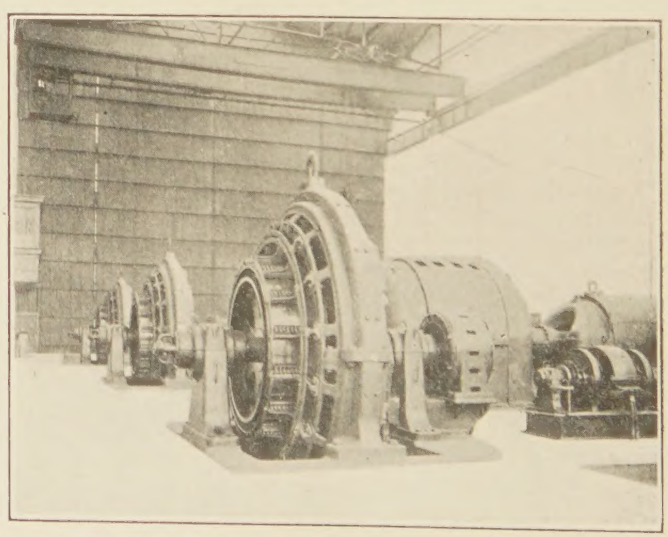
The main steam header is 8 ft. above the boiler house basement floor and is supported by structural steel columns. The supports for the steam header carry steel cover plates surmounted by iron rollers on which the header rests. Thus the header is free to expand or contract without straining its supports. The steam connections from the boilers are made with 8-in. pipe having a long-radius horizontal bend above the boiler setting and a right-angle bend at the side with a vertical pipe leading directly down alongside the boiler to a long-radius vertical bend and a cast-steel manifold connection to the header. These manifolds are used in place of tees wherever more than one connection is made to the header. Each boiler outlet is provided with angle-type valves for both superheated and saturated steam. These valves are of the automatic stop and check type. The installation of the main header in the basement affords a straight run under each row of boilers, and the two are cross-connected at the ends of the boiler house. The cross header at the turbine room end is 14 in. in diameter and leads through separators and 12-in. connections to the turbines. Steam for the auxiliaries is taken from the turbine separators and distributed by an 8-in. main laid out on the ring system.

The high-pressure drip line leads to a receiver near the base of the stack. There is only one steam trap in the entire station and that is on the heating system used in connection with offices and operating rooms.

The boiler blow-off line is located below the boiler house floor and extends from each end of a row of boilers to the center, where connection is made with a single main leading to a tank 4 ft. in diameter and 9 ft. high. This tank is constructed of steel and is vented to the roof. The blow-off water is discharged to the sewer.



Indianapolis Power Station—East Aisle of Boiler Room



Indianapolis Power Station—Turbines and Rotaries

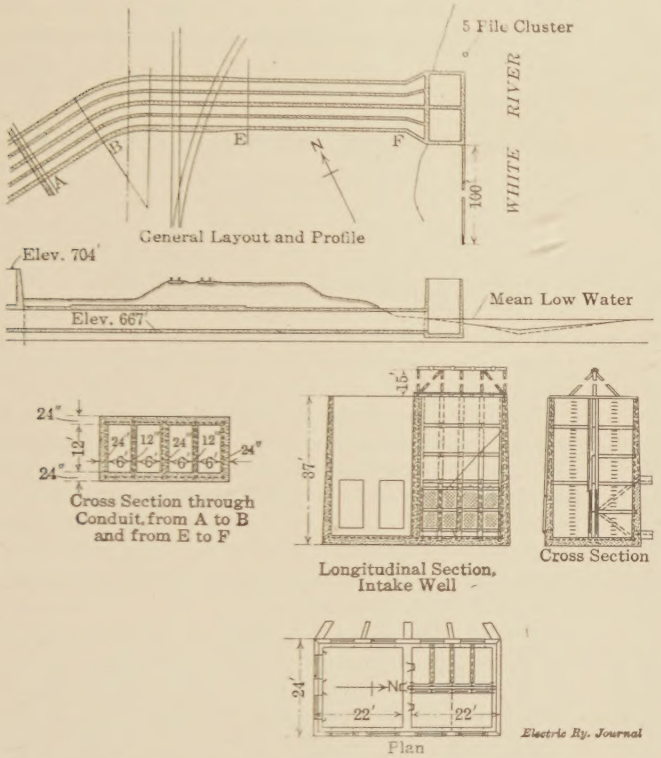
All the high-pressure fittings, including the boiler feed-water system, are of cast steel and the pipe is of open-hearth steel ⅜ in., 7/16 in. and ½ in. thick, with rolled steel flanges, Vanstone joints and Klingeret gaskets. The steam valves are of the Crane steel-body type. The high-pressure fittings are all of steel. All valves and fit-

tings 2½ in. or greater in size are flanged. The blow-off valves are of the Lunkenheimer Duro type and all bronze valves on the boilers and feeder lines are of the Hancock type.

All high-pressure steam lines are lagged with a 4-in. covering of 85 per cent magnesia. Other lines have a covering 2 in. thick. The insulation was manufactured by Philip Carey. The entire piping system of this large new station has been painted in accordance with the standard color scheme of the American Society of Mechanical Engineers, thus making it possible to determine the contents of a pipe from its color.

TURBINES AND CONDENSERS

The two turbine units now installed are of the Westinghouse-Parsons double-flow type. Each unit has a 6000-kw normal rating and 10,000-kw maximum rating with 50 deg. temperature rise for a twenty-four-hour continuous run. The turbines are operated condensing with steam at 175 lb. initial pressure and 100 deg. superheat. The condenser equipment, which will be described later, furnishes 28 in.



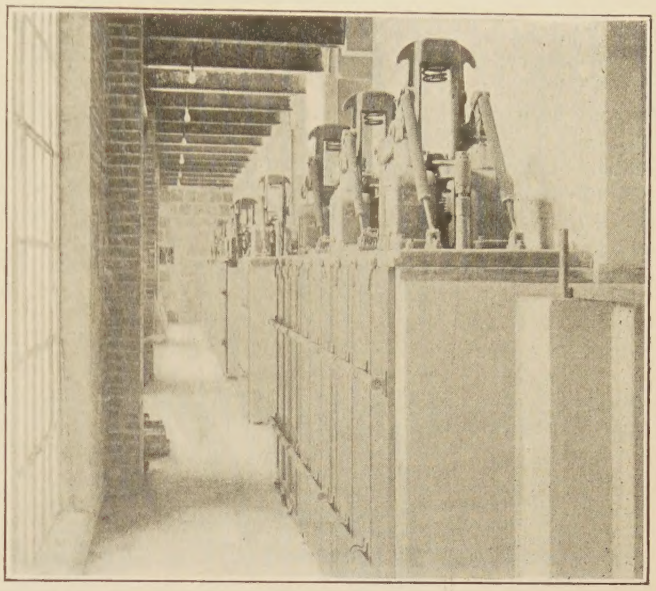
Indianapolis Power Station—Intake Well and Condenser Water Conduit

of vacuum. The electrical ends of the units generate 25-cycle, three-phase current at 13,200 volts potential. These turbines on 28-in. vacuum are guaranteed to have a steam consumption not greater than 15.4 lb. per kw-hr. on 10,000 kw, 15.1 lb. on 8000 kw, 15.6 lb. on 6000 kw and 16.7 lb. on 4000 kw. Two 150-kw, 125-volt exciter sets located in the turbine room furnish exciting current for the turbo-generators. Both machines are direct-connected, one to a small steam turbine, the other to an induction motor.

Ventilation for the generators is supplied through steel ducts from the transformer room basement, which in turn is supplied from the outside. This arrangement serves the double purpose of reducing the temperature of the transformers and supplying tempered air for the generators. It also permits short and direct ducts and prevents the possibilities of danger from dust and foreign particles getting in the generator windings.

CONDENSER EQUIPMENT

The turbine foundations consist of I-beams embedded in a concrete sub-base supported by concrete piers resting on the 3-ft. reinforced-concrete floor slab of the power station basement. Each turbine unit has a Wheeler condenser supported direct from the bottom of the turbine frame structure. This leaves the basement floor space clear and furnishes short exhaust steam connections. The condenser shells are designed for 25,000 sq. ft. of cooling surface, but tubes to afford only 18,000 sq. ft. have so far been installed. The entire arrangement is of the dry-tube type



Indianapolis Power Station—Oil-Switch Gallery

which provides for draining moisture quickly to the sides of the condenser shell so that it does not cut down the heat transference efficiency of the tubing. Circulating water is furnished by Corliss engine-driven centrifugal pumps which stand directly over the intake and discharge tunnels and because of the syphon effect are not required to operate against any head.

Instead of using the ordinary dry-vacuum pumps on this large surface condenser equipment the Le Blanc type pumps are used. This is said to be the first large installation of these pumps with surface condensers. The pumps consist of revolving elements, and thus leaky cylinder and piston rings with their attendant losses in efficiency are avoided.

Indianapolis Power Station—Transformers in Gallery Basement

The condenser equipment is protected against excessive pressure by a 36-in. atmospheric relief valve connecting with free exhaust risers extending to the roof. The relief valves are of the Schutte & Koerting type.

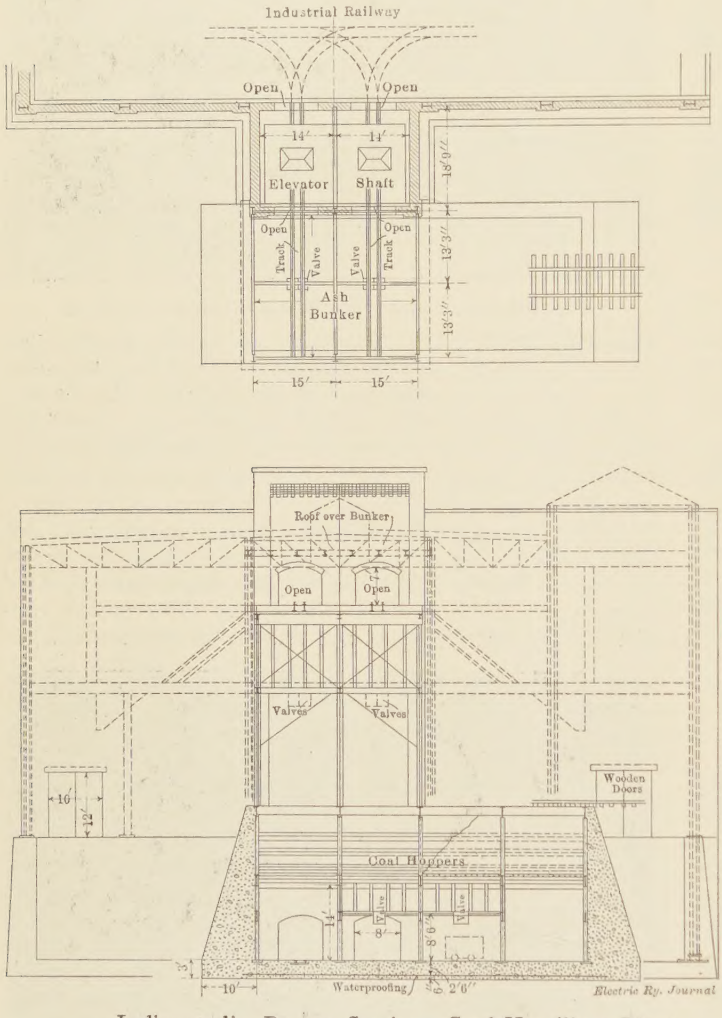
ELECTRICAL GALLERIES

All of the electrical switching and transforming equipment is installed in a 22-ft. x 60-ft. bay adjacent to the south side of the turbine room. This electrical section is subdivided by floors into a transformer room in the basement and four galleries set apart respectively for cables, oil switches, 13,000-volt buses and 33,000-volt buses and line lightning arresters. The control board is on the oil switch gallery, the floor of which is 13 ft. above the turbine room floor. This gallery supports a balcony 30 ft. long in front of the switchboard from which the operator may overlook the entire turbine room. The balcony is sheathed with copper and is inclosed with glass.

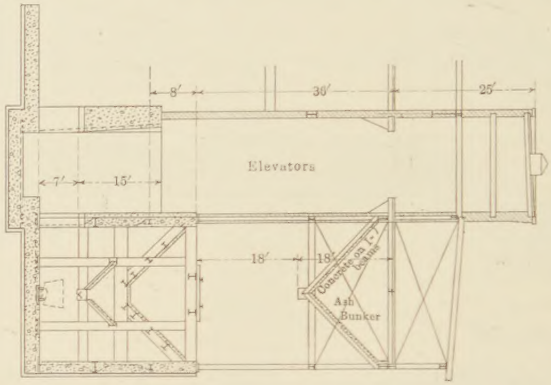
In designing the electrical section of the building it was aimed to reduce to a minimum the switch gear and auxiliary apparatus. As nearly as possible the circuits from the turbines to the outgoing feeders are carried uniformly in one direction, the various sections, of course, being cross-connected by the buses. The switches and instrument transformers and similar smaller apparatus on the various galleries were arranged to avoid parallel and right-angle wiring. Wherever possible every piece of apparatus was placed opposite the line which it controls. The machine switchboard is of the latest desk type placed so that the operator has a full view of the turbine room floor when standing at the board. The location of the board also is such that when the station is doubled in length the switchboard will be at the center line of the station.

The vertical section and elevation on page 385 show the location of the switching and control apparatus. The basement of the electrical gallery section is occupied by step-down transformers and reactances for the three 2000-kw rotaries installed on the turbine room floor and three 75-kva transformers which furnish current for the motor-driven exciter, 30-kw lighting unit, elevator motors, etc. Step-up transformers for feeding the cross-country transmission lines are in the top gallery. The transformers are mounted on steel trucks so that they may be rolled onto a transfer track and moved under the crane for facilitating changes or repairs.

The oil supply system for the transformers includes a motor-driven centrifugal pump which lifts the oil to a storage tank and from which it flows through 3-in. brass piping to the transformers and back to the pump well. The oil-handling system for the transformers includes a small motor-driven centrifugal pump and storage tank with the piping so arranged that the oil can be either pumped from the transformers to a storage tank or vice versa or discharged direct to the river. A shut-off valve is provided for each transformer and the connections are made through unions so that the oil pipes may easily be disconnected if it is desired to move a transformer on its truck.



Indianapolis Power Station—Coal-Handling Plant



All of the principal instrument transformer and switch connections are made from buses inclosed in concrete structures located on the first, second and third galleries. The vertical connections are made through concrete stacks. The generator leads pass under the turbine room floor and into a bus structure on the first gallery where all the instrument transformers are located. In this bus structure the cables are vertical, passing up to either of two parallel rows of oil switches on the third gallery or down from the oil switches to the step-down rotary converter transformers in the first or basement gallery. The duplicate row of oil switches on the second gallery are built in connection with concrete stacks leading directly into horizontal bus structures on the third or 13,000-volt gallery floor. The 13,000-volt lines feeding the step-up transformers in the 33,000-volt gallery are carried through cables in stacks built in the partition wall between the electrical galleries and the turbine room. On the high-tension side of the step-up transformers bare wire is used and the leads pass out of the station through pedestal-type insulators. The outgoing lines are protected by electrolytic lightning arresters.

The 650-volt d.c. feeders for supplying the local street railway system leave the station through underground ducts. This duct system consists of sixty-four single-bore octagonal tiles laid eight wide and eight deep in a concrete box extending to the highway about 150 ft. distant and thence along the highway in both directions. The 13,200-stations which in the future it is proposed to erect, one in the northern part of the city, one in the western part and one in the southern part, will leave the station through underground ducts in the same manner as described for the 650-volt feeders.

STATION LIGHTING

Direct current at 125 volts is used for lighting through-

out the station. This current can be taken off of the exciter buses or from a 30-kw, 125-volt motor-generator set. The general illumination throughout the turbine room, boiler house and basements is supplied by Cooper Hewitt automatic mercury-vapor lamps, provided with special reflectors. These are supplemented by incandescent lamps which serve for local illumination. Eight type P lamps with fifty 1-in. tubes are used to illuminate the turbine room. The boiler house is illuminated by type HH lamps, each having two 21-in. tubes so placed as to give generous, well-distributed illumination, both in the firing aisle and in the basement. This type of lamp is also used in turbine room basement over the condenser circulating pumps, in the transformer room basement, switchboard room and 33,000-volt gallery.

The lighting in the electrical galleries is all provided with three-way switches so that they may be lighted or extinguished from either end of the galleries. Auxiliary lamps consisting of five 100-watt tungsten lamps are spaced on 20-ft. centers around the turbine room wall. In addition, floor pockets are provided for portable lights, five pockets being placed at each turbo-generator and two at each rotary converter and exciter. The lighting wiring is installed in sherardized conduit with Crouse-Hinds fittings.

ENGINEERING

This new station was designed under the direction of Robert I. Todd, president of the Terre Haute, Indianapolis & Eastern Traction Company and the Indianapolis Traction & Terminal Company. Its construction has been carried forward largely by the railway company's engineering staff, which has included T. R. H. Daniels, construction engineer; Charles Hogate, chief engineer of power stations, and L. C. Spencer, electrical engineer. The Bedford Stone & Construction Company had the general contract for the building and foundation. The electrical equipment was erected by its builders with the exception of the bus structures, which the railway company built and designed. The railway company's engineers installed the boiler plant with the exception of the piping, which was done under contract.

DISCUSSION AT BOSTON OF SINGLE-PHASE SYSTEM

At the regular monthly meeting of the Boston branch of the American Institute of Electrical Engineers on Feb. 21 a paper was read by H. M. Hobart, consulting engineer of the General Electric Company, Schenectady, N. Y., on "The Relative Costs and Operating Efficiencies of Polyphase and Single-Phase Generating and Transmission Systems." The paper, which was printed in full in the February *Proceedings* of the Institute, consisted of an extended estimate of the comparative cost of delivering power at a specific point on an assumed railroad by the two systems. The author's conclusions were that the three-phase direct-current system is not only much the most economical for dealing with a dense service of trains making frequent stops but also that it has a much wider field even for a sparse traffic of heavy freight and express passenger trains than is usually assumed.

The paper was discussed by W. C. Smith, C. M. Green, B. A. Behrend, D. C. Jackson, G. T. Mossman and A. E. Kennelly. Mr. Behrend emphasized the point that the state of the art now permits the application of a 25,000-kw turbo-unit for railway service, and believed that the final issue in the electrification problem is the locomotive. Mr. Green emphasized the future possibilities of the mercury arc rectifier and thought it would have extended use in 600-volt and 1200-volt operation.

Twelve cars were burned in Kingston, Jamaica, following an increase in fares put into effect there recently by the company which operates the street railway system in the city.

HEARING ON TERMINAL ELECTRIFICATION AT BOSTON

The committee on railroads of the Massachusetts Legislature gave a hearing on Feb. 29 upon several bills now before the House providing for the electrification of all steam railroads within the Boston district. The most important feature of the hearing was the presentation of testimony on behalf of electricity by Hollis French, of French & Hubbard, consulting engineers, Boston. Mr. French attacked the adverse report of the majority of the Joint Commission on Metropolitan Improvements, which concluded about a year ago that no legislation is necessary as a stimulus to electrification.

Mr. French stated that one of the first arguments in the joint board's report is that electrification does not pay. He took issue with this, quoting former Vice-President W. J. Wilgus of the New York Central & Hudson River Railroad to the effect that "with complete electrification at the New York terminal zone the saving in the cost of operation under electricity will be from 12 to 27 per cent, after providing for the increased capital charges for electrification." Mr. French said that the New York, New Haven & Hartford Railroad management has evidently been careful to give no final figures to the public, but that the statement made by W. S. Murray, electrical engineer of the company, at a meeting in Boston warrants consideration. The latter was quoted as saying: "A most careful analysis between steam and electricity was made in connection with the New Haven lines. I have no authority to state whether the policy of the company in electrifying over 300 miles of trunk-line rails, terminals and yards was for financial gain to itself or better service to its patrons, but at least it is reasonable to assume that with an application of electricity to cover complete passenger and freight train propulsion and yard switching over the mileage named, spending millions of dollars to effect such a service, its directors could not have ratified the extension of the adopted system and its application over such a wide territory in all classes of service unless the successful characteristics of the system were immediately apparent."

Quoting George Gibbs, chief engineer of electric traction for the Pennsylvania and the Long Island roads, Mr. French said: "After two years of operation the cost per car mile was reduced 10 cents, or over 33 per cent, by the adoption of electric traction." He conceded that figures on the Pennsylvania electrification are lacking, but contended that in any event these could not be compared with steam service, since all the Pennsylvania work in New York is new and has never been operated except by electricity. In England the Northeastern Railway Company's report states: "Further experience in electric traction of suburban lines in the Newcastle district has been entirely favorable from a financial point of view. The reduction in expenses has resulted in a net revenue which more than covers the interest on the extra cost of installation necessitated by the introduction of electric power."

Mr. French pointed out that the joint board doubted if the conditions would be as favorable at Boston as in New York. He took issue with this view on the ground that the success of any electrification work depends primarily upon the density of the traffic, and cited the larger volume of traffic handled out of the North and South stations at Boston as compared with that handled at the Grand Central Terminal in New York, deducing from this the much greater likelihood of financial success in the Boston installation. According to the joint board, 60,000,000 passengers are handled at the Boston stations per year as compared with 20,000,000 at the Grand Central Terminal and, reckoning the investment upon the train-mile basis, the Boston roads could count upon about three times the traffic with only two-thirds the investment required for electrification at New York. He declared that the joint

board overestimated the expense and underestimated the profits of electrification. To keep pace with the growth of traffic by using steam is going to be impossible before long, particularly in cities, and the prospects are that adherence to steam will require ultimately an even greater investment than if electricity is adopted. The car capacity of the Grand Central Terminal was 366 with steam operation and 1149 under electricity. If this change in capacity had been carried out under steam operation, the cost would be decidedly greater than the entire cost of electrifying the tracks and terminal. Edward P. Burch estimates this cost at $50,000,000, while the joint board gives the total cost of electrification in New York at the Grand Central Terminal as only $22,000,000.

Mr. French cited the collateral advantages of electrification in the field of sanitation, extension of life of structures, economy of service and real estate betterment. He touched upon the reliability of the service now in operation at New York, the records of the New Haven system showing the equivalent in mileage of eleven round trips from New York to San Francisco with a total delay of only three minutes. In closing, he contended that little weight should be given to the argument of the joint board that standardization of electrical systems has not yet been effected. So long as a through car can be hauled anywhere on any standard-gage road, a passenger can be carried across the country without reference to the method or system involved in his progress. The variability in type allows a choice of motive power which will serve most effectively the purposes of particular terminal conditions. Lack of a universal system has not held back electrification in this country or in Europe. In a year after electrification the South London Railway recovered all the traffic which it lost under steam operation; on the Mersey line out of Liverpool the passengers carried for six months under electrification were 4,500,000, compared with 3,200,000 under steam; on the Northeastern Railway of England the increase was 25 per cent in a single year, and in two years the lines in the Newcastle district gained 47.5 per cent.

HEARING ON MARCH 5

At a continued hearing on March 5 the committee was addressed by Hon. James F. Jackson, former chairman of the Massachusetts Railroad Commission, who appeared as the representative of large property interests in Boston which are seeking railroad electrification as a means of eliminating the depreciation of their structures now caused by locomotive smoke and gases. He contended that electrification is now practicable from both the engineering and commercial standpoints and urged the passage of an act compelling at least the beginning of work. The Jackson bill specifies that the railroads of standard gage in the Boston metropolitan district, which has a radius of about 15 miles from the business center, shall be electrified in such part and in such time as the Railroad Commission shall specify, plans for the initial stages of the development to be submitted to the board for approval by the beginning of 1913.

S. H. Pillsbury, counsel for the Boston & Providence Railroad, a leased portion of the New York, New Haven & Hartford system, said that the executive officers of that company are convinced that the stockholders are prepared to enter into a financial agreement with the New Haven interests by which the necessary funds may be raised for electrification between Boston and Providence. This disposes of the contention that the Boston & Providence lease is an obstacle in the path of the change in motive power. Hon. Nathan Matthews, a former mayor of Boston, also appeared in favor of electrification, citing five promises of the New Haven management to electrify within the period between 1906 and 1912, provided the merger with the Boston & Maine system received legislative sanction.

In opposition to the several bills, Vice-president J. H. Heustis, in charge of the Boston & Albany system, and W. H. Coolidge, counsel for the Boston & Maine and New York, New Haven & Hartford companies, spoke briefly. Mr. Heustis said that the evils of smoke are greatly exaggerated and, while admitting the physical practicability of electrical operation, argued that it would not pay on the Boston & Albany suburban lines. The cost of electrifying between Boston and South Framingham would be about $6,500,000 in initial investment, and the burdens of fixed charges, taking into account possible savings in operating expenses and a substantial increase in traffic, would add over $500,000 a year to the expenses of the system. The revenue of the Boston & Albany lines from passenger traffic in the district bounded by South Framingham and Boston is only $1,300,000 per year, and on the Newton circuit, which is exposed to a sharply competitive street railway service with frequently run cars and low fares, the traffic has failed to increase to any extent in the past ten years. Mr. Heustis reiterated the belief that local traffic on large railroad systems does not pay and urged that no legislation be passed under present conditions forcing the company to electrify.

Mr. Coolidge took his stand upon the majority report of the joint board against electrification legislation, as discussed by Prof. G. F. Swain, of that body, last year. He maintained that President Mellen and his associates have refrained from advocating inter-terminal subways and other developments at the present session in order to find out what the public actually desires. Until a comprehensive agreement as to lines of development can be made the company cannot undertake the electrification of its Boston lines.

PROPOSED TRIP OF EXECUTIVE OFFICERS A. E. R. A.

President McCarter, of the American Electric Railway Association, has sent a circular letter to the members of the association describing the six-weeks' trip which the officers of the association are planning to make through the country this spring in the interest of the association. Mr. McCarter says:

"The trip has the entire co-operation of the American Electric Railway Manufacturers' Association, several of whose principal officers will accompany the party. Starting from New York on April 17, it is proposed that the trip shall include a visit to central points in the South, Southwest, Middle West, Pacific Slope and extreme Northwest. The object of the trip is to show the interest of the association in its member companies and the members generally located so far from the home office of the association and from its usual convention sites that by reason thereof they are not kept in as close touch with the affairs of the association and do not receive as much benefit from the convention as those situated nearer at hand. It will be our aim and desire to meet at these central points not only all the friends of the association located thereabouts, but all others interested in the development of electric railroads who may not have as yet identified themselves with the association. We shall also be glad to meet such public men and citizens generally in the communities visited as our members may desire and to confer with them upon any problems relating to the industry where we can be of any service to our membership. A detailed itinerary of the trip is being prepared and will be forwarded to you in due season."

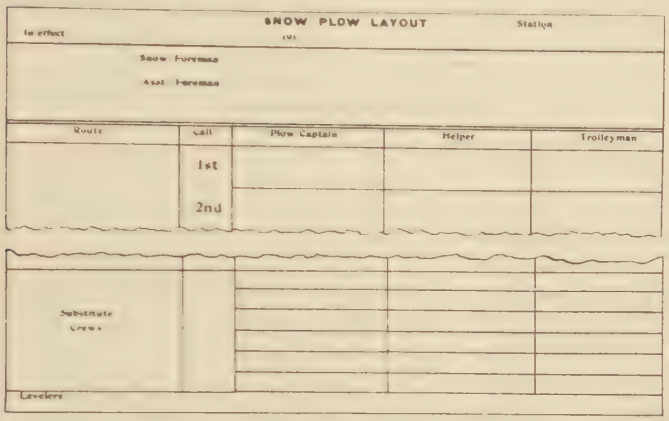
The Dayton & Troy Electric Railway is at present investigating the practicability of installing a combination storage-battery and motor-generator set on its cars for car-lighting purposes. The tests are being made by the Dayton Engineering Laboratories Company, and the results obtained to date are said to be very satisfactory. The cost of the storage batteries and motor-generator set which are being used for test purposes, and including the cost of installation, was $150.

Coping with Snow in Boston

The Writer Describes the Snow-Fighting Methods of His Company, and Also the System of Segregating the Costs for This Work

BY EDWARD DANA, ASSISTANT TO SUPERINTENDENT OF TRANSPORTATION, BOSTON ELEVATED RAILWAY

When the winter season approaches the street railway employee, hired during the halcyon days of summer travel when work on an open car in hot weather is a most desirable occupation, hears the oldtimers discuss the hardships of winters long since gone by and receives his first instructions as to what will be expected of him in snowtime. He sees a new phase of the business and before his second summer arrives will have proved his worth or have abandoned the occupation for one less rigorous.


SNOW PLOW LAYOUT

In effect ... 191 ... Station

Snow Foreman

Asst. Foreman

Route	Call	Plow Captain	Helper	Trolleyman
	1st			
	2nd			

Substitute Crews

Laborers

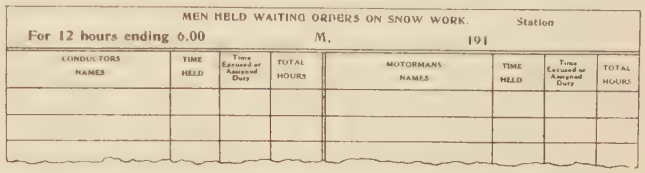
Fig. 1—Boston Snow Fighting—Assignment of Snow Forces

The fleecy, gray clouds that float across the skies during the transition from fall to winter predict to those in responsible positions all that is to follow. They are the "handwriting on the wall" of the sleepless watches for the enemy that silently falls in the night, the sleet storms and gales, the treacherous rail conditions and the long hours of labor in the biting cold.

In order to maintain service during snowtime in the 125 square miles served by the Boston Elevated Railway much forethought and a well-developed organization are required. Although the latter is used but a few times during the year, it must on no account be allowed to become rusty in any of its parts. This organization requires 233 electric snow plows, representing energy to the amount of 15,000 hp, which, operated over 142 plow routes, have to keep 477 miles of track open, an average of 1¾ miles per plow. To man these plows on the first call 699 men are needed, and as many more as relief on the second call, making a total of 1398 trained plow men besides a number of substitutes to fill vacancies. About 613 men from the track department are required to care for special work, hills, bridges and sweeping tracks. The entire territory is divided into thirty-four shoveling and carting districts demanding thirty-seven foremen, 154 sub-foremen, 896 teams and 2173 men. The disposal of the snow at the dumps requires ninety-nine more sub-foremen and 753 men. The company itself owns 622 pungs or box sleds.

The magnitude of the task may be appreciated when it is known that $500,000 has been spent in one winter and a single storm has cost $120,000. This expense would amount to much more if the organization had not been carefully planned.

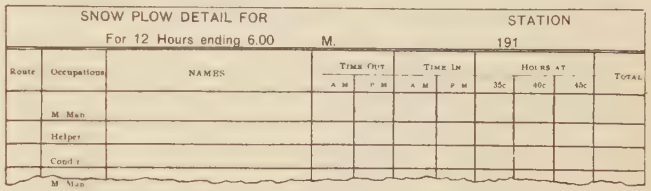
The forms to be described are means of carrying on the work. Fig. 1 is used to designate men assigned to snow work. Previous to its make-up, meetings are held on the several divisions and the men are required to signify their willingness for the work. They receive thorough instructions as to their responsibilities, and are reminded of the necessity for clothing themselves adequately. The district foreman, sub-foreman and snow paymasters are chosen at this time and receive ample opportunity to become familiar


MEN HELD WAITING ORDERS ON SNOW WORK. Station

For 12 hours ending 6.00 M. 191

CONDUCTORS NAMES	TIME HELD	Time Excused or Assigned Duty	TOTAL HOURS	MOTORMANS NAMES	TIME HELD	Time Excused or Assigned Duty	TOTAL HOURS

Fig. 2—Boston Snow Fighting—Men Held for Snow Work


SNOW PLOW DETAIL FOR STATION

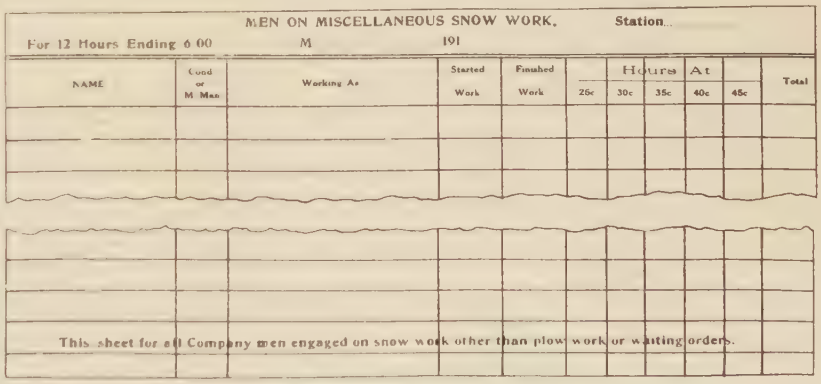
For 12 Hours ending 6.00 M. 191

Route	Occupation	NAMES	Time Out A M	Time Out P M	Time In A M	Time In P M	Hours at 35c	Hours at 40c	Hours at 45c	Total
	M. Man									
	Helper									
	Cond'r									
	M. Man									

Fig. 3—Boston Snow Fighting—Time Detail on Men at a Given Station

with their duties. To the messengers address lists are given, and long before the winter sets in they are actually sent out to verify them, to insure their having knowledge of where to go, what door to use and what bell to ring.

When snow begins to fall at night and the weather conditions are otherwise right for a storm the call men go out to notify the plow crews. When these forces begin to report, their time is entered on Fig. 2 as men held "waiting orders," for which they are paid 30 cents an hour. Snow is not allowed to accumulate to any extent before plows are


MEN ON MISCELLANEOUS SNOW WORK. Station...

For 12 Hours Ending 6.00 M 191

NAME	Cond or M. Man	Working As	Started Work	Finished Work	Hours At 25c	30c	35c	40c	45c	Total
This sheet for all Company men engaged on snow work other than plow work or waiting orders.										

Fig. 4—Boston Snow Fighting—Station Report on Miscellaneous Labor

operated over the routes upon which the severest conditions are usually encountered.

The time of such men is then terminated on the waiting order sheet and entered on Fig. 3, snow plow detail. The motorman of the plow receives 40 cents an hour and attends to power, diggers, directs salting and sanding and, in fact, is captain of the plow. The helper receives 35 cents an hour and rides on the front as assistant to the captain and

to attend to the nose wing. The trolleyman receives 35 cents an hour and rides on the rear to attend to the trolley and the long wing. Very explicit instructions are issued as to the method of operating snow plows in order to do the work properly, although no hard and fast rules can be made, as conditions vary and good judgment is necessary on the part of the plow crew. Of paramount importance is the rule to leave no ridges and to scrape down to the pavement between tracks and rails, and where streets are wide enough to clean a space at least 10 ft. outside of the tracks.

Miscellaneous work is entered on Fig. 4. The several time sheets are for twelve-hour periods from 6 o'clock to 6 o'clock and are summarized on Fig. 5. Day cards (Fig. 6) are used for each plow in order to compute the mileage and to know the work done by each plow. It may be seen from these forms that snow work is carefully separated from the transportation payroll.

The time sheets are forwarded to the division office, where they are verified. The information, as well as the work of the road department and carting sections, is en-

Summary of Snow Expense — Station

For 12 hours ending 6.00 M. ... 191

Summary of all Wages of Conductors and Motormen on Snow Work at Various Rates

Rate¢	25¢	30¢	35¢	40¢	..¢	Total
No. of hours						
Amount						

Classification of Above Wages

Items	Division		Other Divisions		...	
	No. of men	Amount	No. of men	Amount	No. of men	Amount
Plow Wages						
Leveller Wages						
Misc. Labor Dist. Foreman						
Sub. Foreman						
Waiting Orders						
Checkers						
Paymaster						
Sand or Push Cars						
Totals						

Summary of Snow Expense Other Than Wages

Teaming		Time Worked			Amount
		... Day	... Day	... Day	
No. of Company's Teams on Levellers	at ...				
" " " Carting	at ...				
" Hired " " Levellers	at ¢				
" " " " Carting	at ¢				
NOTE 2 Horses to be considered a Team.		Total Cost of Teams			

Miscellaneous Expense Meal Tickets (Estimated)

No. of Plows Used ... Mileage of Plows ...

REMARKS
(Enter Names of Foreman, Checkers etc., on Road Dept. Payroll)

Fig. 5—Boston Snow Fighting—Summary of All Expense for a Given Station

Boston Elevated Railway Company.

Day Card ... Snow Plow No. .....

Date 191

Station

Time Out	Time In	Route Number	No. of Trips	Names of Plow Crews

Station Master or Starter in charge must sign below as certifying correctness of time entered thereon and forward same to Day Supt. at once.

Station Master or Starter.

Fig. 6—Boston Snow Fighting—Day Card

SNOW TIME MEMORANDUM

NAME

This sheet used to alphabetically draw off each day from ... time book ... sheet made up

Fig. 8—Boston Snow Fighting—Detail Memorandum Used as Payroll Basis

BOSTON ELEVATED RAILWAY CO. FROM ... M. TO ... M.

DAILY LAYOUT AND REPORT OF SNOW WORK. DATE ..... 191 PAY NIGHT DIVISION STORM NO.

SECTION NO.	FOREMEN AND SUB-FOREMEN	LOCATION OF WORK	LOCATION OF DUMP	THIS NEED NOT BE DIVIDED BY STREETS: TEAM SHOVELLERS COMPANY (Lay-Out, Ass't, Bank)	TEAM SHOVELLERS HIRED (Lay-Out, Ass't, Bank)	MEN ON DUMP COMPANY (Lay-Out, Ass't, Bank)	MEN ON DUMP HIRED (Lay-Out, Ass't, Bank)	OTHER SHOVELLERS COMPANY (Lay-Out, Ass't, Bank)	OTHER SHOVELLERS HIRED (Lay-Out, Ass't, Bank)	TEAMS COMPANY (Lay-Out, Ass't, Bank)	TEAMS HIRED (Lay-Out, Ass't, Bank)

SUMMARY OF COST	NO.	AMOUNT	TOTAL
COST OF MEN AS PER SNOW PAYMASTER'S PAY ROLL			
" " " ON REGULAR PAY ROLLS, ROAD DEP'T			
" " " " " " " " PLOW LABOR			
" " " " " " " " LEVELLER LABOR			
" " " " " " " " MISC. "			
" " TEAMS HIRED, (TAKEN FROM TICKET STUBS)			
" " " COMPANY			
MISCELLANEOUS EXPENSES (ESTIMATED)			
TOTAL COST FOR DAY OR NIGHT			

REMARKS

CORRECT

NO. OF PLOWS USED

PLOW MILEAGE—

Fig. 7—Boston Snow Fighting—Complete Daily Log of Work Done

tered on Fig. 7 in duplicate, one copy being sent to the superintendent of transportation. The names are drawn from the time sheet each day on to alphabetical sheets (Fig. 8) to facilitate the make-up of the snow payroll at the end of the week. It is essential that the names appear alphabetically here in order to assist the paymasters. At the division office also there is kept an hourly report of the plows on the wire on the several routes. The information on this report is passed along to the superintendent of the day at the main office and entered on Fig. 9, so that the

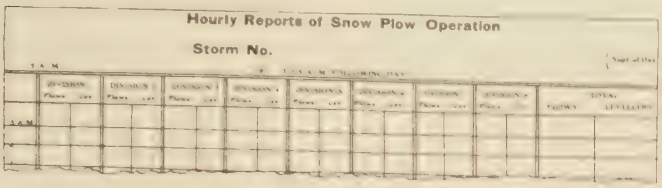


Fig. 9—Boston Snow Fighting—Hourly Snow Plow Report by Divisions

officials by communicating with him may know of conditions on the entire system.

As soon as it is determined that snow must be hauled the teams and men are energetically started out. This work, like the plow work, is under the direct supervision of the district foreman. The sub-foremen have charge of the

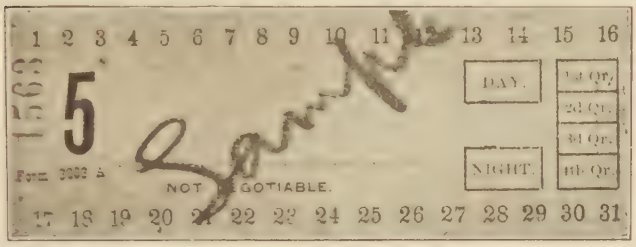


Fig. 10—Boston Snow Fighting—Labor Ticket

individual gangs. The time of snow laborers is kept and accounted for by a ticket bearing the division number, a serial number and the signature of the foreman. Fig. 10 10 represents a $1.75 ticket. The $2.25 ticket is pink. These tickets are punched by the foreman every quarter. He also keeps a check list to assist him in making proper return of tickets charged out to him. Meal tickets (Fig 11) are also issued, good for 25 cents' worth at lunchrooms with which arrangements have been made. These tickets must be forwarded with the bill signed by the person who

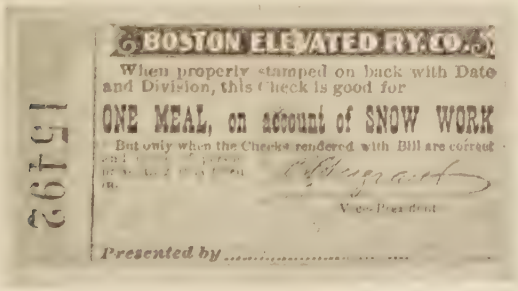

BOSTON ELEVATED RY. CO.
When properly stamped on back with Date and Division, this Check is good for
ONE MEAL, on account of SNOW WORK
But only when the Checks rendered with Bill are correct
Vice-President
Presented by

Fig. 11—Boston Snow Fighting—Meal Ticket

presents it. A ticket (Fig. 12) is provided to account for hired teams. The properly punched coupon is given to the driver and the stub is retained for checking when the bill is rendered.

An estimate is made of the probable funds necessary to pay the special snow payrolls, whereupon the snow paymaster takes a requisition to the treasurer. He then visits the various sections to collect the tickets and pay the laborers what is due them. He fills out Fig. 13 and forwards it to the auditor with the tickets. He also makes a list on Fig. 14 of tickets issued but not presented for payment.

Another form used, which is not reproduced in this article, is entitled "Recapitulation of Snow Expense." This gives the following data for each of the divisions: plows

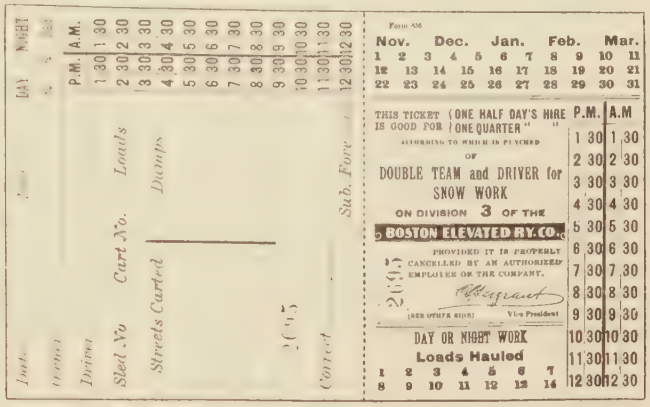


Fig. 12—Boston Snow Fighting—Team Ticket

used, plow mileage, wages snow-masters' payroll, wages road department snow labor, wages on plows, wages on levelers, holding men, miscellaneous snow labor, expense

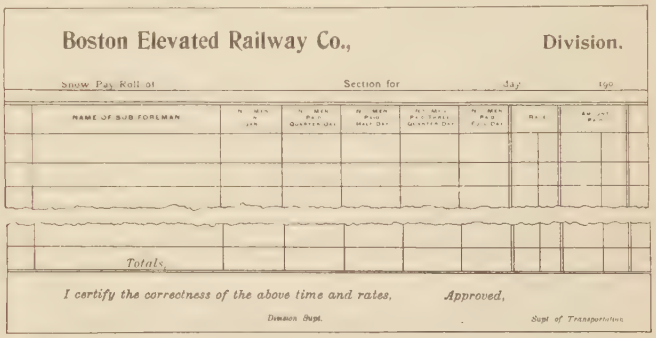

Boston Elevated Railway Co., Division.
Snow Pay Roll of Section for day 19
NAME OF SUB-FOREMAN
Totals.
I certify the correctness of the above time and rates,
Approved,
Division Supt.
Supt of Transportation

Fig. 13—Boston Snow Fighting—Payroll for a Given Section

for teams, estimated miscellaneous expense, total, and number of company horses. The top of the form gives the serial number of the storm for the current and the hours of the day and night during which it occurred.

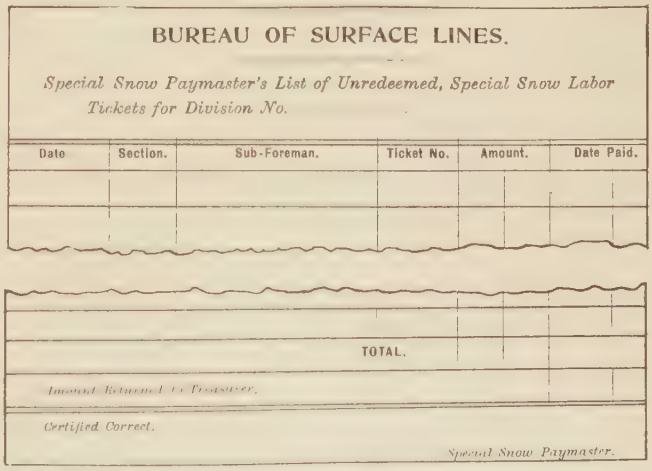


Fig. 14—Boston Snow Fighting—Detail of Unredeemed Labor Tickets

The general office is kept constantly advised of actual conditions upon the system through the superintendent of the day. Each morning at 8:30 report is made to him of the snow lay-out arranged for that day and duly recorded. As before mentioned, Fig. 7 is received at the office of the

superintendent of transportation each morning for the day and night previous. These are summarized into a statement on Fig. 15, which is submitted to the vice-president.

The detail outlined has been the culmination of experience gained from many hard struggles in New England winters. Snow fighting is always an unsatisfactory task, for after each storm one can see better ways of doing things than those that were followed. Boston, however, has never suffered any serious lack of street car facilities which could rightly be attributed to insufficient effort on the part of the company.

PSYCHOLOGICAL TESTS FOR ACCIDENT PREVENTION

An informal meeting of a number of men interested in electric railroading and psychology was held last week in New York. Among those in attendance were Martin J. Insull, general manager Louisville & Northern Railway; F. W. Johnson, superintendent Bureau for Prevention of Accidents, Philadelphia Rapid Transit Company; Prof. Hugo Munsterberg, head of the department of psychology, Harvard University; Henry R. Seager, professor of political economy at Columbia University and president of the American Association for Labor Legislation; Frederick Lee, professor of physiology, Columbia University; Prof. Howard Marsh, of the College of the City of New York; Charles H. Verrill, of the United States Bureau of Labor, Washington, D. C., and John B. Andrews, secretary of the American Association for Labor Legislation. The meeting was held at the office of Mr. Andrews, Metropolitan Tower, and Professor Seager, of Columbia University, presided.

MR. INSULL'S PAPER

Mr. Insull read a paper in which he reviewed the methods now followed by electric railway companies to reduce accidents. He then said, in part:

"The results obtained through those means have certainly been far-reaching. They have, where used, materially decreased the number of accidents, but the maximum results to be so obtained, at least on our line, have, I believe, already been reached. Furthermore, the fact that a conductor or motorman has received a high mark in an examination on the rules is no indication that he is a safe man. In some of those examinations men who receive a mark among the lowest may have a far cleaner accident record than he who stands at the top. Far be it that I should be understood to infer that the means we are at present taking should not be continued, improved and enlarged to the limit. I am, however, strongly of the opinion that they alone are inadequate to bring about that safety of operation which the operating officials hope for and the public, either as our patrons or our security holders, have a right to expect, provided there are additional means by which it can be accomplished.

"My company's accident records very distinctly indicate the correctness of this position. In 1908 we had 417 accidents reported on our lines. In the fall of that year we took up actively the question of accident prevention at quarterly meetings with our men, and I commenced to give a great deal of personal attention to the subject, notwithstanding I am also responsible for the operation of an electric light, gas and water business in addition to that of our street and interurban lines. In 1909 we reduced our accidents to 235, in 1910 to 199, and in 1911 they went up a trifle, to 206. It is the great reduction in 1909 as compared with 1908 and the comparative uniformity in the number of accident reports per year since that have led me to the conclusion that the maximum efficiency of safety with the present means at our disposal has practically been reached.

"Up to about nine months ago I considered the enforcement of the rules the most important factor in promoting safety. I have changed my opinion only to the extent of now feeling that it is only one among other equally important factors. The change came about when I found that high marks in an examination on rules did not necessarily indicate a high degree of safety of operation in the motorman or conductor examined. On further study I concluded that in our efforts to promote safety we had entirely overlooked that very important factor, the mentality of the men on both ends of the car. The more I considered it the more it seemed to me a great mistake to employ men without having any idea of their mental qualifications for a class of work in which human life and limb and financial success are at stake and which requires constant concentration of mind, keen powers of conscious observation, absolute control of conscious volition and the ability to keep cool and use good, quick judgment under the most critical conditions. The same general problems, although differing in details, confront the steam railroads, on which in the year ended June 30, 1911, 10,393 people were killed and 150,159 injured. Of the number killed 356 were passengers, 3602 were employees and 6438 were trespassers, etc. It is the same problem to which E. F. Peck, general manager Schenectady Railway, referred about a year ago, in a paper before the Street Railway Association of the State of New York on 'Collisions on Interurban Roads and Their Causes,' in the following terms:

"'My object in reviewing the accidents that have just been cited was to call your attention to the fact that without exception 80 per cent of the serious accidents which have happened on interurban electric roads have been caused by the frailty of human nature. The rules in practically all the cases were adequate and sufficient to prevent the mishap if the employees had performed their duty. It is seldom that interurban collisions are caused by faulty car equipment or defective roadbed, and while it may be said that the varying conditions of the weather many times contribute to the causes of such collisions, the largest percentage of this sort of accident is chargeable to lack of judgment on the part of crews or to the gross carelessness of the motorman. This at once brings up the question as to whether or not the trainmen whom we employ are sufficiently examined as to their mental qualifications and rigidly enough trained in obedience. * * * It would seem that we have an intricate problem to solve, one which might be classified as mental or human engineering. It is a question that involves not only the motorman and conductor but also the trainmaster and dispatcher. The collision of interurban cars has been minimized to a certain extent by the installation of double tracks, improved dispatching methods and the use of modern block signals, but no matter how perfect the protective device and danger-proof appliances, as long as the forgetful or disobedient motorman is assigned to cars the preventive virtues of up-to-date railroad devices will amount to little. It is emphatically the man in charge of cars to whom we must look for the prevention of collisions. He must obey his orders and be so trained that in case of emergency he can be trusted to use good judgment.'

"If we can, by such tests and training as Mr. Peck suggests, be assured that the men we are now employing and those we shall employ in the future are competent men, without having to wait for time and accidents to determine it, this conference will, in my opinion, have initiated a national benefit. In speaking of employees, I should feel that I was doing my own men an injustice if I did not take this opportunity of publicly expressing my gratification and pleasure at their loyalty, co-operation and favorable response to every suggestion I have made to them in our united efforts to promote safety on our lines. I am particularly impressed with their co-operation at this present time, as on Jan. 30, at our most recent quarterly meeting, I spoke to them on the 'Safety of Operation,' pointing out the necessary line of thought and action to avoid certain classes of accident, and I am informed by telegraph this morning

that February is our record month so far as a low number of accidents is concerned."

DISCUSSION.

In the discussion which followed Professor Munsterberg described in a very interesting way some tests conducted by psychologists in the field of education, in medicine and law. Among other things he said:

"Experimental psychology in industry is not new, but it is yet in its infancy. It was at the instigation of psychologists that the simple tests for color blindness to which railroad men are subjected before being accepted were begun. The problem of the railroads, both steam and electric, is only a small part of the great problem of how psychology can be of use to industry. The interests of the modern psychological laboratory as far as industry is concerned are twofold. The first problem is to find out what the efficiency of men is, possibly also how it may be increased. The second is psychological analysis of the demands of the various industrial vocations.

"A vocational bureau was started in Boston three or four years ago, where tests are applied to boys and girls to determine the work to which their best powers adapt them. When this is done no one will go into industries or arts for which he is not fit. This work is undertaken by a study of the requirements of the different vocations, then by a study of the qualities of the boys and girls, and then by an examination of the way in which these qualities may be correlated with the requirements of the vocations.

"The waste of human material in the world to-day is appalling. Thousands go into vocations for which they are in no sense fitted by nature or education. It is going to be a problem for us to analyze the requirements of different vocations, from that of the lawyer, doctor and architect to the laborer in the factory or the motorman in the electric car, which is the problem of this conference. Our psychological laboratories to-day are fitted for problems of education, but not yet very largely for problems of industry.

"Imagination and attention, almost every company agrees, are necessary powers of a motorman. But there are many kinds of attention, and in order to have a test of any value we must be able to specify definitely. Some individuals have what is called the attention of concentration. They can watch one thing well. Others have the attention of expansion, in which they can put their minds at the same time on many things.

"It would be unwise to apply in industrial work the tests already developed for education and medicine. The conditions are so different that we must take up that field by itself and adjust the particular forms of psychological tests to the special vocational requirements. For the motorman, tests as to the rapidity of action, as to certain kinds of attention, memory, imagination, intelligence and ability to judge a complex situation, will stand in the foreground. These tests may be carried on with relatively simple technical means."

L. W. Chaney, of the United States Bureau of Labor, Washington, D. C., said that the practical man demands immediate results. The scientific man insists on a long period of investigation. "This makes it difficult," Mr. Chaney went on, "for them to get together. We have not yet determined what are reasonable hours of labor. The most promising experiments in this direction are those of the efficiency engineers. They have mathematical formulas by which they may calculate the time that a man may be under a given physical stress without harm. The expert psychologist should add to this a similar study of the proportion of time under which a man may be safely under mental stress. Fatigue is by no means the only factor entering into the rhythmic occurrence of accident. For example, in a Bessemer steel mill employing over 200 men it was found that the peak of activity very nearly coincided both morning and afternoon with the peak of accident. This suggests very forcibly that the speed of action is the primary factor in the number of accidents. At the end of each working interval when activities slacken accidents decrease. It is quite possible, therefore, that fatigue by diminishing the rapidity of action tends definitely to decrease the number of accidents rather than to increase them."

Professor Lee, Columbia University, said that one of the elements to be considered in industry is the change of fitness from day to day and hour to hour in the same man. "Fatigue does not determine the number of accidents in industrial plants," said Professor Lee. "Between 10 and 11 in the morning and 4 and 5 in the afternoon is when the maximum of accidents occur. That the maximum does not occur at 12 and 6 may be because at the end of each half day the man's attention becomes intense at the prospect of relief from work."

At the conclusion of the meeting Professor Munsterberg was appointed chairman of a committee, consisting of those present, to investigate the duties of trainmen and the possibilities of determining the adaptability to these duties of applicants for employment on electric railways. Professor Munsterberg said that he hoped to be able to make a preliminary report on this subject by next June.

STUDENTS AS CONDUCTORS ON DENVER TRAIL CARS

A description of the practices of the Denver City Tramway in using students in the high school and the Denver University as conductors during rush-hour service is published in the February issue of the *Bulletin* published by that company. The article is written by J. A. Beeler, vice-president and general manager of the company. It states that the problem of handling extra traffic during the daily rush-hour operation has been solved in Denver by this practice.

The "student conductors" are selected by the superintendent and instructor with special reference to ability, size and general habits. They are from nineteen to twenty-two years of age and learn readily. Actual platform time at regular schedule rates is paid. The young men procure the regulation uniform and spend from two to four hours every day on a trailer. Mr. Beeler says that the regular trainmen like the idea of student helpers as the extra list is reduced materially by their employment and it is easier to secure permission to be absent from duty than it was formerly. The faculty and teachers at the university and high school like the plan because it enables many young men to secure an education.

Photographs and statements of a number of the men who have worked in this way are presented in the article. One student at the Denver University stated that by a few hours' work each day for the company he was enabled to pay current expenses, relying upon savings during the summer to meet his tuition fees.

Mr. Beeler summarizes briefly the advantages of trailer operation. One unit can be handled on the streets with less liability of accident or collision than two units. The regular motorman is usually more experienced and efficient than the extra man and can handle a train as readily as a single car. By the use of the center side entrance type of car neither passenger nor employee can step from one car to the other, thus eliminating this kind of accident. The car permits rapid loading and unloading. The conductor can always see the entrance and the motorman can see the steps of the trailer as well as those of the motor car in his mirror. The trail car seats and carries as many people as the motor car. Owing to the Tomlinson coupler, no jerking or surging is apparent. The dead weight of the trailer per seated passenger is about one-third that of the motor. The advantages are reflected in the power house, where 1.33 kw-hr. per trailer car mile is required as against 3 kw-hr. per motor car mile. There is also a saving in wear and tear of tracks by the substitution of light trail cars and a saving in the wages of one man per car.

Chicago Council Committee Recommends Improvement in Service During Rush Hours

Report Includes Data Showing the Totals of Passengers Carried on Surface Lines During the Fiscal Year 1910 and 1911

A report has been made by a sub-committee of the local transportation committee of the City Council of Chicago, outlining the complaints of the public and the committee's recommendations for improvement of existing conditions. The sub-committee recommended that the report be adopted at once, but owing to the objection of teamsters that such action would have the detrimental effect of delaying the deliveries of 30,000 teamsters, final action was postponed for one week from March 4. An abstract of the report follows:

"Many complaints have been brought to the notice of your committee, all of which have been referred to the companies for attention. In many instances we are now advised by the companies that the schedules have been changed, cars added on other lines, and that other complaints which have not been remedied are still under consideration and will receive attention. It is our opinion that just cause for complaint exists in regard to what may be termed inadequate service, due largely to the following causes:

"A good deal of complaint arises because cars are not run on regular scheduled time. They are badly bunched. One material cause, in our opinion, is the undue obstruction of the tracks by team traffic occupying the street railway tracks, whereas teams should travel on the side of the tracks.

"Another is the inevitable lack of effort to maintain schedule time of the cars, due in our opinion mostly to a lack of close supervision over the movement of cars, both at terminals and en route.

"A further cause seems to be switchbacks on trunk lines, which, in our opinion, could be eliminated to a large degree by a loop service at terminals, instead of switchbacks.

"We recommend a more thorough supervision by supervisors at principal terminals and time points along the line, to the end that cars be kept on schedule time, and in connection with this we recommend the dispatch system.

"We recommend that, in so far as it is possible to accomplish it by police regulation, team traffic be excluded from the car tracks in the district bounded by North Avenue on the north, Ashland Avenue on the west and Twenty-second Street on the south.

"We recommend further that the police department throughout the city make all possible efforts to keep teams from the tracks and from delaying the street car traffic; and in connection with this we recommend an increase in the number of mounted police, to such an extent that this service may be installed eventually along the entire route of all main thoroughfares on which car lines are operated.

"We believe the present method of removing the snow from the tracks and piling it along the side thereof interferes with the carrying out of the recommendations for keeping tracks clear of the ordinary traffic.

"We therefore recommend that the commissioner of public works, the board of supervising engineers and the railway companies make a thorough investigation of the snow-melting devices now in operation in other cities.

OBSTRUCTION OF STREETS

"We recommend further that, particularly in the downtown district, the street department restrict permits for the use of street space for building material to the smallest possible space necessary to accomplish work, and much of this use of the streets should be restricted to the night hours. We further suggest that all steam railway companies be requested to avoid delays of trains at grade crossings.

"Wherever practicable we recommend the installation of loops instead of switchbacks for turning cars, especially at terminals. Such terminal switchbacks should not be tolerated on trunk lines or in congested traffic districts. Where cross-overs are placed for emergency purposes they should be far enough away from street intersections to avoid the blocking of street crossings.

"We recommend the immediate establishment of short through route service between the two companies as a means of doing away with present switchback terminals, especially in the downtown center, and that all such short through routes should have loop terminals instead of switchbacks wherever possible.

"We recommend that adequate provisions be made for taking care of the vast industrial districts immediately outside of the downtown loop in the three divisions of the city.

"Much traffic that should be carried to its destination in a direct way is brought into the downtown center needlessly.

"Schedules should meet at intersecting lines, particularly on trunk lines, and such service should be increased from time to time to meet the demands of the traveling public.

UNNECESSARY STOPS

"We recommend the elimination of unnecessary stops on lines where intersecting cross streets do not meet, by placing signs where stops are to be made, and suggest that the companies make recommendations as to the elimination of such stops and submit them to the City Council.

Table I.—Headway at Busy Street Intersections in the Loop District.

Street Intersection.	Headway.
La Salle and Madison	11 seconds
La Salle and Washington	11 seconds
Clark and Randolph	11 seconds
Dearborn and Randolph	11 seconds
Dearborn and Washington	11 seconds

Table II.—Chicago Railways Company—Operating Statistics for the Years Ended Dec. 31, 1910 and 1911.

	1910						1911					
	Total Passengers.	Car Miles.	Car Hours.	Passengers per Car Mile.	Passengers per Car Hour.	Car Miles per Hour.	Total Passengers.	Car Miles.	Car Hours.	Passengers per Car Mile.	Passengers per Car Hour.	Car Miles per Hour.
January	34,369,673	3,878,897	485,785	8.8610	70.750	7.9848	48,094,358	5,471,852	652,259	8.7892	73.735	8.3892
February	31,816,436	3,673,270	461,672	8.6610	68.916	7.9570	40,709,304	4,342,737	513,298	9.4130	79.308	8.4254
March	37,705,656	4,305,941	527,972	8.7568	71.417	8.1535	46,359,737	4,841,366	569,248	9.514	80.913	8.5050
April	37,722,411	4,186,306	509,573	9.0840	74.008	8.2154	46,997,235	4,643,691	542,424	10.121	86.642	8.5610
May	40,053,974	4,295,405	525,182	9.3248	76.268	8.1790	50,545,827	4,845,931	560,907	10.431	90.114	8.6392
June	40,605,739	4,231,589	518,342	9.5960	78.340	8.1680	50,131,828	4,697,841	541,241	10.672	92.626	8.6798
July	42,402,993	4,361,094	532,871	9.7230	79.576	8.1742	51,168,475	4,923,990	560,882	10.392	91.230	8.7790
August	43,480,614	4,362,274	535,506	9.9674	81.195	8.1462	52,012,140	4,900,207	556,629	10.615	93.444	8.8032
September	41,203,215	4,137,752	506,131	9.9580	81.236	8.1580	49,039,039	4,668,673	526,801	10.504	93.088	8.8622
October	43,144,495	4,204,136	513,246	10.2620	84.060	8.1912	50,333,565	4,801,658	538,068	10.483	93.545	8.9238
November	40,546,471	4,008,031	488,001	10.1160	83.084	8.2132	47,392,417	4,660,355	520,863	10.169	90.988	8.9472
December	41,713,742	4,186,956	506,198	9.9628	82.406	8.2714	48,020,984	4,841,696	537,569	9.9182	89.328	9.0066
Total	474,765,419	49,831,651	6,110,479				580,804,909	57,639,997	6,620,189			
Average	39,563,785	4,152,638	509,207	9.5276	77.700	8.1554	48,400,409	4,803,333	551,682	10.064	87.624	8.7066

"Schedules, in our opinion, should be rearranged from time to time to meet changing conditions, particularly as between summer and winter, and they should be varied during the daytime to meet load conditions, to the end that more time in rush-hour service per car may be had. Sufficient time should be allowed for the crew to prepare their cars for the return trip.

"The occasional excessive rate of speed of the cars we consider to be inconsistent with good railroading and the safety of the public, and we believe proper schedules will eliminate this objection.

"We believe that electric switches will save time in switching of cars, and urge the immediate installation of them throughout the city wherever practicable. We understand that the Chicago Railways Company has purchased 100 of these switches to be installed at once.

NEW CARS

"We are advised that the board of supervising engineers and the Chicago Railways Company have met with numerous delays in the installation of the 215 new cars provided for by the ordinance consolidating the Chicago Railways Company and the Consolidated Traction Company, passed on Oct. 10, 1910.

"Upon inspection of the company's shops, we find that a large number of these cars are now in course of construction and are being put upon the streets as rapidly as possible, and we are assured by the management of the company that from twenty to twenty-five cars per month will be added from this time on, and that the complete number of 215 cars will be in service by Nov. 1, 1912.

"In this connection we are advised by the Chicago City Railway that a sample of the 'near-side car' will be delivered by March 10, and on the approval of that car by the city the company will immediately place a contract for sufficient cars to equip one trunk line, about 125 cars, with a guaranteed time delivery of four months after the date of signing the contract.

"We further find that there is no definite provision in the ordinance of 1907 for adding new cars from time to time beyond those now under way, that the natural increase in the traffic of the Chicago City Railway is about 6 per cent per annum, and that of the Chicago Railways Company about 5 per cent per annum. We think that the board of supervising engineers and the companies should make definite provision for adding new cars from time to time in the future to take care of the steady increase of traffic; additional cars should be provided for emergency purposes and to replace broken or worn-out cars, and consideration should be given to the added increase that will be required by the displacement of old single-truck cars which are now in service.

PASSING PASSENGERS AND REFUSING TO STOP

"Attention is also called to the indiscriminate passing of passengers, which we believe should only be done in cases of blockades or in the event of an overloaded car, and better judgment should be used. Attention is called to the indiscriminate turning back of cars along the lines by car crews, which in our opinion should be done only after blockade, and then when controlled by proper supervisory officials.

SERVICE CONDITIONS

"Your committee realizes that the downtown terminals have about reached their maximum capacity and that therefore the betterment of the service on downtown lines is becoming more difficult, hence every possible effort should be made to divert through traffic around the loop and thus afford opportunity to add the needed cars to and from the loop in the rush hours and afford better service for all. We would add, however, that no pains should be spared by the companies or the city to give adequate service on all lines where track capacity has not been reached. While we realize that the 55 per cent of net receipts is affording the city an increasing annual income, and we have no desire to reduce it, we believe the public desires adequate service rather than increased receipts to the city.

"The bringing under one management and ownership of the surface lines would materially aid, in our opinion, in removing present downtown or loop congestion by the elimination of present operating conditions with loops and switchbacks in the heart of the city."

Table I shows the headway at busy street intersections in the loop district.

Table II shows operating statistics for the years ended Dec. 31, 1910 and 1911, of the Chicago Railways Company.

Table III shows operating statistics for the years ended Jan. 31, 1911 and 1912, of the Chicago City Railway.

TABLE III.—CHICAGO CITY RAILWAY OPERATING STATISTICS FOR THE YEARS ENDED JAN. 31, 1911 AND 1912.

1910-11							1911-12						
1910.	Total Passengers.	Car Miles.	Car Hours.	Passengers per Car Mile.	Passengers per Car Hour.	Car Miles per Hour.	1911.	Total Passengers.	Car Miles.	Car Hours.	Passengers per Car Mile.	Passengers per Car Hour.	Car Miles per Hour.
February ...	23,409,283	2,702,900	319,634	8.6606	73.237	8.4563	February..	25,666,983	2,778,270	319,302	9.2366	80.386	8.701
March ...	27,202,229	3,061,455	349,433	8.8852	77.972	8.7614	March ...	28,763,271	3,160,219	353,742	9.1016	81.312	8.9336
April ...	27,113,356	2,978,636	337,795	9.1027	80.264	8.8176	April	29,029,549	3,050,590	341,804	9.5164	84.934	8.925
May ...	28,489,418	3,079,800	347,313	9.2504	82.028	8.8674	May	31,288,428	3,190,397	356,711	9.807	87.714	8.944
June ...	28,817,592	3,040,291	343,463	9.4787	83.904	8.8518	June	30,217,564	3,103,942	346,939	9.735	87.098	8.946
July ...	29,861,417	3,137,781	353,370	9.5168	84.504	8.8796	July	31,334,452	3,214,854	358,860	9.7467	87.318	8.9586
August ..	30,479,406	3,160,451	357,590	9.644	85.232	8.8378	August ...	31,500,251	3,246,571	362,106	9.7024	87.012	8.968
September ..	28,755,122	3,002,522	336,769	9.5792	85.406	8.9158	September.	30,459,752	3,131,503	348,091	9.727	87.506	8.9962
October	30,104,997	3,091,503	346,866	9.738	86.792	8.9127	October...	31,781,916	3,240,650	360,458	9.803	88.17	8.9902
November...	28,127,997	3,020,363	339,270	9.3128	82.908	8.9026	November.	29,982,048	3,127,442	348,364	9.587	86.064	8.9774
December...	28,572,867	3,152,648	353,605	9.0634	80.807	8.9158	December.	30,569,976	3,250,009	361,046	9.4064	84.67	9.0014
1911.							1912.						
January	27,632,841	3,107,185	348,106	8.8932	79.382	8.9258	January...	28,696,674	3,278,352	371,378	8.754	77.272	8.8276
Total	338,566,525	36,535,535	4,133,214				Total ...	359,290,864	37,772,799	4,228,711			
Average	28,213,877	3,044,628	344,435	9.2668	81.914	8.8396	Average...	29,940,905	3,147,733	352,393	9.512	84.965	8.9324

MOTOR PINIONS

The proceedings of the 1911 convention of the American Society for Testing Materials have been published and contain a paper by J. S. MacGregor and Bradley Stoughton describing a method of testing case-hardened gears with a Fremont impact testing machine. The method consists in cutting down the width of the tooth to ¼ in., but leaving the hub at the original dimension. In this way the section of tooth left on the hub is held firmly and prevents the test blow from having a glancing impact upon it. Results from tests on a case-hardened pinion showed an impact absorbing effect of 20,560 ft. lb. and, on a hardened steel pinion, 19,370 ft. lb.

In the discussion of the paper G. L. Fowler, New York, brought out the point that bad metal in heat cracks on the armature side of a pinion was much more effective in producing failures owing to the tendency for the outer end of the shaft to spring away from the gear. He also called attention to the heavy stresses produced in pinions pounded on to the shaft with a sledge, and recommended using a moderate shrinkage fit by placing the pinion in boiling water before putting it on the shaft. This was fully described in an article by Mr. Fowler in the ELECTRIC RAILWAY JOURNAL for Sept. 3, 1910.

MILO R. MALTBIE ON JUDICIAL REVIEW OF REGULATIVE COMMISSIONS

Milo R. Maltbie, member of the New York Public Service Commission of the First District, made an address before the Western Economic Club at Chicago on March 1 on the subject "Judicial Review of Public Regulation." He said that the success of government regulation depends in large measure upon the attitude of the courts toward the decisions of national and state commissions and the scope of judicial review. An abstract follows:

"No matter how perfect the plan enacted by the Legislature, it will soon resemble a toothless invertebrate if judicial review is unlimited, and excellent results may be obtained under an inferior plan if the courts support and strengthen it.

"The theories upon which our whole political system is based require that it shall be possible for any person injuriously affected by a decision of an administrative body to appeal to the courts at some stage of the proceeding. The question is not, therefore, whether judicial control should be eliminated, but rather how far that control should extend and how far the courts may go in setting aside the decisions of co-ordinate branches of the government.

"Doubtless all will agree that the courts should decide whether an act of an administrative body violates a provision of the state or of the United States constitution. An act of the Legislature may be declared unconstitutional just as effectively as an administrative order. It is likewise clear that the courts should determine whether the regulative body is acting within the authority delegated to it by the Legislature or by the constitution. In the third place, it is proper that the courts should have the right to review the procedure leading up to the issuance of an order or the performance of an act by a regulative authority, so that it may determine whether the course followed was regular in every way.

"It should be pointed out that there is no court review of acts of the Legislature upon the ground that they are unwise, inexpedient or unwarranted. If, therefore, the Legislature delegates its authority to regulate corporations to an administrative body, and if the courts are to have the right to review the acts of this administrative body upon the grounds of reasonableness, propriety, etc., the corporations thus obtain an additional method of review which they did not possess. The purpose of regulation is to curb the unrestricted power of corporations, not to provide additional means to delay and prevent action.

"But I hear some one say: 'What if these commissions are unfair, are not guided by the evidence and do not exercise good judgment? Should it not be possible to appeal to a higher authority?' The same question might be asked in relation to the Legislature, but there is no appeal except to the electorate. Is it not more likely that a body created and selected for one specific purpose will perform this one function with greater efficiency, fairness and wisdom than another which has many other duties?

"However, administrative bodies are responsible to the person who appoints them, or to the electorate, if they are elected. Their terms are comparatively short in most cases, and there is usually some method of removing them from office. They are also responsible to the Legislature. Their offices may be abolished, their authority may be curtailed, their decisions may be set aside. In these ways commissions are subject to more control than the Legislature itself, and certainly to a greater control than the courts.

"One reason why the courts should not receive authority to review administrative orders of commissions is that judges are not selected primarily for this function. They are chosen presumably because of their legal knowledge and not because of any familiarity with public utilities or methods of regulation or knowledge of the needs of the public.

"One of the principal reasons for the creation of special administrative bodies to supervise corporations is that judicial methods and remedies have been neither effective nor satisfactory to the public. Judicial bodies are not well organized to regulate public service corporations. The interference with efficiency which will come from a wide court review on every ground can hardly be overestimated. Another objection to the theory is that it will tend to lessen responsibility."

NEW POWER STATION OF CHARLESTON CONSOLIDATED RAILWAY & LIGHTING COMPANY

The Charleston Consolidated Railway & Lighting Company, Charleston, S. C., is constructing a new power station to meet the increasing needs of its railway and power distribution business. The station is located on the Cooper River, which is part of the harbor of Charleston, and is built after plans drawn by Harris & Richards, of Philadelphia. The contractors in charge of construction are N. W. Lindsay & Company, of Philadelphia. The location selected was chosen because it is near the center of distribution and will also provide an abundance of water for condensing purposes.

The station is built upon a foundation of piles driven from 40 ft. to 60 ft. The reinforced-concrete platform constructed on this foundation has side-wall footings 10 ft. in height. The walls of the station are of steel and masonry, with a coating of stucco to conform with the architectural appearance of the better class of buildings in Charleston. By the selection of a site on the harbor coal can be secured by either boat or rail.

The power station will be 119 ft. 4 in. square, outside dimensions, and will contain two 2000-kw Curtis turbines and one 1000-kw turbine of the same type. The smaller turbine is now in use temporarily in the existing plant, but will be moved as soon as the new plant is entirely completed. The engine room has a 20-ton Cleveland crane. The window openings will be of Pond continuous sash made by David Lupton's Sons Company. The steel main entrance and interior doors generally will be furnished by the Dahlstrom Metallic Door Company. Kinnear rolling steel doors will be used for the large exterior openings to the boiler room. The old station will be maintained for reserve purposes.

The 2000-kw turbines will be connected with LeBlanc condensers built by the Westinghouse Machine Company. One centrifugal D'Olier pump will be provided. There are five Franklin boilers of 528 hp each, with forced draft. Vigilant automatic feed-water regulators and Dean shaking grates and Warren-Webster feed-water heaters will be used. A standpipe 10 ft. in diameter and 50 ft. in height will be erected to receive feed water from an artesian well 2200 ft. deep. The normal flow of the well is about equal to the anticipated peak demand for feed water, and it comes from the ground at a temperature of 99 deg. Fahr. and with a natural head of 60 ft.

The electrical equipment of the station will include three 500-kw motor generators for the railway service, two 125-kw GE turbo-exciters and one 35-kw GE induction motor-driven exciter. A 300-kw rotary converter, now in the old power plant, will be transferred to the new plant. A 100-kw booster will be used for the power transmitted across the harbor in a submarine cable and used by the Seashore electric railway line of the company. The stack, 200 ft. in height, has been provided by the Alphons Custodis Company. The switchboard which is in the gallery will consist of fourteen alternating-current panels, two exciter panels and twenty direct-current panels. The high-tension switches will be operated by remote control.

It is expected that the plant will be completed about July 1 of this year.

PORCELAIN-GLAZED METAL STIRRUP FOR PASSENGER STRAPS

The Railway Improvement Company, New York, N. Y., has recently brought out a modification of its sanitary hanger, the stirrup of which is hung from the rod by loops of leather, as shown in the accompanying cut. This stirrup consists of a piece of steel tubing covered with white porcelain enamel which has been glazed on at a temperature of 1800 deg. Fahr. This portion is of the same construction as the sanitary hangers which have been in use on the subway cars of the Interborough Rapid Transit Company, New York, for over two years. The difference is that the Interborough type of hanger has a spring in its upper part to keep it in tension at an angle to the hanger rod when it is not in use. The spring prevents the swaying of the hangers. Of course, the incorporation of the latter feature is optional. The first Interborough hanger was described on page 883 of the Electric Railway Journal for May 8, 1909. Both types of hangers not only have the advantage of being sanitary, but, being open, they are much more easily grasped than the old style of strap hanger.

Metal Stirrup for Passenger Straps

SHOP TALKS ON MAINTENANCE

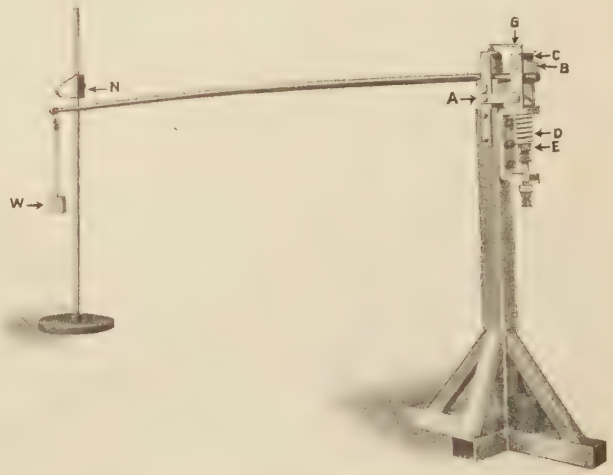
An ingenious method of arousing the interest of shopmen in car maintenance questions has been originated by the Galena-Signal Oil Company. This is the practice of having their experts give half-hour talks at midday meetings with the aid of two large charts, one of which shows drawings of the Galena company's standard packing and lubrication methods for car equipments, and the other a 5-cent piece from which radiate lines with such titles as "inspection," "dust collars," "new bearings," "check plates," "delays,"

A Talk on Car Maintenance

"melting metal," "salt water," "pedestal liners," "accidents," "tools," "complaints," "current," "coal pile," "square trucks," "brakes," "bearings," "shock," "misfits," etc. The lecturer considers maintenance problems from the trolley wheel to the track, and shows how many nickels must be earned to correct a seemingly small mistake. In giving these talks, the expert uses for texts the wording on the nickel chart, inviting questions on each topic. The lecturer also displays a collection of journal boxes, bearings, gearing, etc., to present concrete instances of good or bad work. This unusual manner of bringing out the importance of each class of maintenance work has met with keen appreciation from the shopmen, who enjoy this opportunity of learning the meaning and value of their daily tasks. Both charts are printed in white on a black background so that they can be easily read.

TESTING SEAMLESS COLD-DRAWN TROLLEY POLES

The Electric Railway Journal for Dec. 31, 1910, contained a description of the Standard A and Standard B poles made by the National Tube Company, Pittsburgh, Pa., a tabulation of the loads and deflections of these poles under test and an account of a pole-testing machine used to measure deflection under load. The machine hereinafter described is used to test every pole made by this company



Machine for Testing Seamless Trolley Poles

to determine its set. The method of using this machine for each particular size of pole will be understood from the following description and the lettered illustration referred to therein.

The pole is set in the machine, resting on the block *A*, which is fixed except that it is free to rotate about an axle on which it is supported. The pole also passes under a second block *B*, which is supported on a pivot in the frame *C*. When the weight is hung from the free end of the pole this frame moves vertically against the resistance of the spring *D*. The tension of the spring is adjusted by the nut *E*. The upward movement of the frame against the resistance of the spring causes the frame to close a circuit at *G*, whereby current illuminates a lamp located within the supporting frame of the machine. The lighting of the lamp therefore indicates that the standard load has been applied. Before attaching the weight *W* to the pole the sliding index *N*, which is placed upon the opposite stand, is adjusted until it is in contact with the free end of the pole. When the weight is removed the sliding frame *C* is drawn back to its seat by the spring. The free end of the pole should then return to the index. If the tested pole does not touch this index it is evident that a set has resulted from the application of the load. All poles which show a set under this test are rejected.

The Interstate Commerce Commission records for the fiscal year of 1910-11 show that less than three-tenths of 1 per cent of the lives lost in railroad accidents were chargeable to broken rails.

NEW COMBINATION CARS FOR GARY & SOUTHERN TRACTION COMPANY

The accompanying halftone and drawing show one of the two compartment combination passenger and baggage cars recently placed in service on the Gary & Southern Traction Company's lines between Gary and Crown Point, Ind.

Seating Arrangement of Combination Car for Gary, Ind.

Owing to low overhead clearances, it was necessary to use a very flat single-arch roof and to mount the car body as low on the trucks as the motors and wheels would permit. The extreme height from the track to the top of the roof is only 11 ft. 5¾ in.

As a large percentage of the passengers who use the cars are steel workers, the car is plainly finished inside. It is furnished with spring rattan seats in the main passenger compartment and with folding wooden slat seats along each side of the baggage compartment, which also is used for smoking.

The general dimensions of the car are as follows: Length

Exterior of Combination Car

over buffers, 44 ft. 6 in.; length over vestibules, 43 ft. 6 in.; length of car body, 32 ft. 6 in.; extreme width, 8 ft. 8½ in.; width over sills, 8 ft. 5 in., and height from the under side of the sills to the top of the roof, 8 ft. 7¾ in. The underframe is of semi-steel, composed of two 6-in. I-beam center sills and two ⅝-in. x 7¾-in. outside sill plates. The seating capacity is forty-four persons. The interior finish is of quartered oak with dark weathered finish. The ceiling is single-arch type of Galco painted and decorated. The Gothic sashes have seven sections of art glass in zinc channels. National sash locks and Forsyth No. 88 curtain fixtures are used. The seats are Ford & Johnson's No. 52-S type and are fitted with pedestal base and stationary foot rests.

The cars are equipped with National straight air brakes, Peacock hand brakes, Lintern compressed-air sanders, Mason safety step treads, Peter Smith hot-air heaters, Crouse-Hinds combination headlight and Knutson trolley retrievers. The trucks are of the Baldwin Locomotive Works latest improved type, Class 73-18-K, with new-style equalizing bars, double equalizing springs, improved transom gussets and brakes and without end frames. They weigh only 6500 lb. each, including 4½-in. axles fitted with 33-in. Standard forged-rolled steel wheels having 3-in. tread and 1¼-in. flange. These trucks carry four No. 307 40-hp motors which are geared for a maximum speed of 40 m.p.h.

The cars were built by the Niles Car & Manufacturing Company, and were equipped complete ready for service at the car works before shipment. They weigh about 23 tons each without live load.

THE LOHMANN PROCESS OF COATING BY LEAD

A new method of coating the surface of iron or steel by a non-corrodible metal of the lead group, or by a combination of these metals, has recently been perfected under the name of the Lohmann process. This process is exactly similar, so far as the apparatus needed is concerned, to the present hot-dip galvanizing method. The article to be treated is thoroughly cleansed either by a sandblast or in a pickle composed of sulphuric acid, etc. It is washed and then placed in the so-called Lohmann bath, containing the chemicals used in this process. An immersion of from one-half minute to two minutes only is necessary. During this period the pores are cleansed of oxygen and an amalgamating agent is deposited over the surface so that when the article is dipped in the molten metal the pores are filled and, it is claimed, an integral union or chemical weld is made between the surface of the article treated and the non-corrodible coating.

At present the almost universal coating, of course, is zinc, which, as a metal, is brittle and disintegrates rapidly under certain conditions and, of course, is not resistant to sulphurous or sulphuric-acid fumes and vapors. On the other hand, the resistive qualities of lead to sulphurous fumes are well known. A large number of experiments with the process during the past year indicate that a coating composed of 100 parts of lead and one of tin suits most conditions, especially in sheet work, as it is very pliable as well as a good resistant to corrosive action. Another combination, composed of ten lead, one zinc and one tin, is used in various articles where extreme pliability is not needed and where a bright appearance is desired in the finished article. This coating is not as resistant to sulphurous fumes as straight lead but resists to a very large degree these conditions.

The cost of the process depends on the character of the metal used. The lead-tin combination is cheaper than spelter, and the ten, ten and one runs about 2 cents a pound per pound of treated metal more than spelter at the present market prices. At the same time a much thinner coating is secured and it is quite possible that, with the savings in dross, etc., the actual cost will be the same, if not a little less, with all articles except sheets.

The process seems to be of a very extensive applicability, and a coating of lead has been suggested in electric railway work not only for the metal parts of overhead appliances, but even as a coating for steel cars and track appliances, such as tie plates and angle plates. The process is owned by the Lohmann Company, New York.

PURCHASE OF LACONIA CAR WORKS

The Laconia Car Company Works, Laconia, N. H., have been taken over by a new company, the Laconia Car Company, in which the Boston banking houses of Hornblower & Weeks and Richardson, Hill & Company are interested. Cornell S. Hawley, president and treasurer of the Consolidated Car Heating Company, of Albany, N. Y., is to head the new company. In addition to Mr. Hawley the directors are: P. W. Whittemore, treasurer of the old company; Louis A. Frothingham, William H. Hill, Henry Hornblower and Henry C. Wiley, all of Boston, and P. L. Hughes, the New England manager of the Cudahy Packing Company. The company was established in 1842 and builds steam and electric railway cars.

News of Electric Railways

Statement by Brooklyn Rapid Transit Company on Latest Subway Offer

Timothy S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, has issued a statement in part as follows in regard to the subway offer of the Interborough Rapid Transit Company of Feb. 27, 1912, referred to in the Electric Railway Journal of March 2, 1912, page 361:

"The pending offer of the Interborough Rapid Transit Company, together with statements by members of the Board of Estimate and Public Service Commission favorable to such offer, give evidence that the city is preparing to ask this company to modify the program mutually agreed upon last summer for the construction and operation of rapid transit lines. This company has been aware that negotiations looking toward a return to the so-called 'dual plan' of transit development have been in progress for some time, and we were asked to give and did give to the public officials concerned an informal expression of our attitude on the subject. We stated that while we were prepared to carry out, and strongly preferred to carry out, the arrangement agreed upon on July 21, 1911, we would not seek to embarrass the members of the Board of Estimate and the Public Service Commission in what we believed to be a sincere endeavor to reach a basis of agreement with the Interborough Rapid Transit Company that would provide on proper terms for the completion of the so-called 'H' system in Manhattan and the Bronx. We, however, made it plain that should we be asked to modify the arrangement agreed upon last summer we would feel ourselves free to make our decision as to the acceptance of any proposed modification, or as to a withdrawal from the situation, upon all the facts as they might then exist.

"The position of the Brooklyn Rapid Transit Company remains the same to-day. The company has sought from time to time assurances from the city officials that nothing in the negotiations with the Interborough Rapid Transit Company would be allowed to interfere with the essential features of the plan designed to provide relief for upward of 2,000,000 of the citizens of New York.

"The pending offer of the Interborough Rapid Transit Company raises a final issue as to a number of specific questions which this company considers vital to the interests of which it has become the trustee. Convinced that the matter at stake is too important to justify the omission of any precaution, the company has asked that assurances covering these specific points be formally given.

"The Brooklyn Rapid Transit Company is glad to announce that it has had an informal promise from Mr. McAneny, president of the Borough of Manhattan, that satisfactory assurances touching all these points will be forthcoming, and when they shall have been received the company will promptly announce the fact."

Progress of Negotiations in Toledo

Under an agreement reached by City Solicitor Schreiber of Toledo and Attorney Rathbun Fuller, representing the Toledo Railways & Light Company, on Feb. 27, 1912, the city will have full control of the operation of interurban cars over the city lines of the company. Contracts between the Toledo Railways & Light Company and the interurban railways must have the approval of the City Council, which is also to prescribe the speed of the cars, stops, service and the question of fares and transfers. However, the rate of fare and conditions of issuing and receiving transfers will be considered when the same subject relative to the city cars is taken up.

Attorney Fuller objected to a forfeiture clause which Mr. Schreiber wanted to incorporate in the franchise relative to interurban contracts. If the company should enter into an agreement with an interurban railway without first consulting the city, giving the city control of the operation of the cars, the fares and transfers and the right to fix stops for taking on and discharging passengers, Mr. Schreiber wanted so to word the agreement that this would operate as a violation of the franchise. In connection with this Mr. Fuller stated that there are a number of other strict forfeiture clauses further on in the ordinance to be considered later and that they will have to be modified.

It was impossible to secure a quorum on Feb. 29, 1912, the date set for the regular meeting of the directors of the company. President F. R. Coates stated that no meeting would be called until March 28.

Plans and specifications for the twenty new cars to be purchased by the company have been completed and arrangements were made to ask for bids on March 2. It was stated that the bids would be opened on March 9.

Plans for Rehabilitation in Pittsburgh

J. D. Callery, vice-president of the Philadelphia Company and president of the Pittsburgh (Pa.) Railways, announced to the Councils of Pittsburgh on March 6, 1912, the details of the Pittsburgh Railways' improvement program, which is authorized to be completed within two years. The company agrees to spend $5,881,343 on improvements and extensions, including track elevation, power houses, bridge reconstruction and new rolling stock, apportioned as follows: Power house and substations, $699,102; carhouses and machinery, $467,563; car equipment, $627,500; overhead lines, $121,450; track construction, $2,138,022; track elevation, $43,946; new second track, $794,951; bridges, Y's and loops, $738,809; grading, $250,000. The plan to hold a special meeting of the stockholders of the Philadelphia Company on April 29, 1912, to increase the capital stock of the company from $48,400,000 to $73,400,000 to provide funds for these improvements and for other purposes was referred to in the Electric Railway Journal of Feb. 24, 1912.

Federal Employers' Liability Act

H. C. Donecker, secretary of the American Electric Railway Association, has sent to member companies a letter about Senate Bill No. 5382, read on Feb. 20, 1912, by Senator Sutherland, of Utah, and entitled "A bill to provide an exclusive remedy and compensation for accidental injuries resulting in disability or death to employees of common carriers by railroads engaged in interstate or foreign commerce, or in the District of Columbia, and for other purposes." While the proposed bill deals only with interstate business, Mr. Donecker refers to the tendency of the states to follow the lead of Congress in matters of this kind and he says that notice of this proposed legislation is given so that members may secure a copy of the bill and analyze the provisions and thereafter take such action as may seem necessary with the Congressmen representing their respective districts.

In this connection it is of interest to note that in submitting to Congress the report of the employers' liability commission and the commission's proposed bill covering the question, President Taft said in regard to objections which have been advanced by opponents of this legislation: "In the first place, the question arises whether, under the provisions of the commerce clause, the bill could be considered to be a regulation of interstate and foreign commerce. That seems to be already settled by the decision of the Supreme Court in the employers' liability case. The second question is whether the making of these remedies exclusive and the compelling of the railroads to meet obligations arising from injuries for which the railroads would not be liable under the common law is a denial of the due process of law which is enjoined upon Congress by the fifth amendment to the Constitution in dealing with property rights. This question the report takes up, and, in an exhaustive review of the authorities, makes clear, as it seems to me, the validity of the act. It is sufficient to say that the argument of the commission is most convincing to show that the police power of the government exercised in the regulation of interstate commerce is quite sufficient to justify the imposition upon the interstate railroads of the liability for the injuries to its employees on an insurance

basis. The third objection is that the right of trial by jury, guaranteed by the seventh amendment, is denied. As a matter of fact, the right is preserved in this act by permitting a jury to pass upon the issue when duly demanded, in accordance with the limitations of the act."

The bill drafted by the commission eliminates the common law doctrine of negligence with what it characterizes as the unjust defenses of assumption of risk, fellow servant's fault and contributory negligence. Compensation with a general basis of an equivalent to one-half wages is to be paid in every instance except where injury or death is caused by the wilful intention of the employee to injure himself or another or in case of intoxication on duty. The commission points out that for every dollar the railroads are compelled to pay under existing law they will, under the proposed law, pay approximately $1.25, and that for every dollar the employees and their dependents now receive they would receive a sum much in excess of $1.25. After a fourteen-day period following the injury employer and employee are to agree in writing on a settlement; arbitration committees may be organized by them to settle disputes and award compensation, subject to review within two years by an "adjuster of accident insurance," to be appointed by each United States District Court for four-year terms at $1,800 to $3,000 annually. No contract or device of any kind is to relieve the employer from any liability under the act. The monthly wages are to be considered as not more than $100 nor less than $50 a month, with certain exceptions. Monthly payments of death benefits are to be made for eight years, thus: A widow, alone, 40 per cent of the monthly wages; widow and child under sixteen or otherwise dependent, 50 per cent; any child under sixteen or dependent, 25 per cent, and 10 per cent for each additional child; payments, if the widow dies or remarries within eight years, to be continued to the children, if any, for the unexpired period.

Schedules and Other Matters in Cleveland

The local union of employees of the Cleveland railway sent a letter to the company on Feb. 29, 1912, attacking the new schedule on Superior Avenue and declaring that the agreement that the men shall have a four-minute layover at the end of each run is being violated. The letter followed a conference between a committee of the union and President John J. Stanley. The men assert that they cannot keep to the time fixed by the new schedule. Formerly sixty-eight minutes were allowed for a round trip, but this has been cut to sixty minutes, the trip each way to be made in twenty-eight minutes, with a four-minute layover. Representatives of the men say that eight regular crews have been forced to the extra list and that these men work only a few hours each day now. Those who were on the extra list have still less work. Following a meeting of the men a statement was issued to the effect that the men cannot operate the cars at the speed required without increasing the chances of having an accident.

President Stanley stated that the city fixed the schedules and ordered the cars run according to them. The men, he said, will probably ask for arbitration, as provided in their agreement with the company.

Peter Witt, street railway commissioner, has maintained that the trouble was between the men and the company. Chairman Haserodt of the street railway committee of the City Council is inclined to blame President Stanley for the protest from the men. He is reported to have said that the company incited the men to protest in order to insure the failure of 3-cent fare.

On March 1, 1912, Mr. Stanley issued the following statement:

"The company enters upon its third year of operation under the Tayler plan to-day. Both the city and the company have profited in the period just closed. More power has been given the city and additional safeguards provided for the company's investment by amendments to the ordinance. The fare, inaugurated at 3 cents with 1 cent for transfer, has been reduced to straight 3 cents. The reduction, made without protest, tested the strength of the provision for adjustable fare and established the company's good faith with its patrons. The city, through its Mayor, has pledged its co-operation with us in our operations, and we enter upon the third year confident that any future adjustment of the fare or regulation of allowances will be made in the same satisfactory manner. The twin problems of additional cars and power to provide greater facilities must be solved soon, but the city is working on them, the money necessary has been provided and the company stands willing and ready to act. The same harmony that has existed in the past between city and company, if continued, should secure greater benefits for the car rider than he has enjoyed in the past."

On Feb. 29, 1912, engineers of the city, the Cleveland Railway and the Cleveland Electric Illuminating Company discussed the kind and capacity of a plant that would supply the railroad with sufficient additional current. They agreed that an 11,000-volt, 25-cycle, three-phase generating system would be required. The company desires to purchase power amounting to 15,000 kw. Mr. Witt asked the engineers to figure the cost of 60-cycle current, the same as used in electric lighting.

A committee from the union called upon Mr. Stanley on March 2 and asked that the old schedule on Superior Avenue be restored. Mr. Stanley informed the men that he could do nothing in regard to the schedule, as it had been made by the city. The committee then visited Mr. Witt.

Philadelphia Subway Ordinance to Councils.—Mayor Blankenburg of Philadelphia, Pa., sent the franchise ordinance of the Philadelphia & Suburban Elevated Railway, designed to give it the right to build a subway under Broad Street with elevated branches, to Councils at the special session on Feb. 29, 1912. The proposed ordinance was referred to a joint committee on street railways and finance.

Bids Asked for Another New York Subway Section.—The Public Service Commission of the First District of New York is advertising for bids for the construction of Section 2-A of the Lexington Avenue subway. Bids will be opened at noon on March 22. Section 2-A lies in lower Broadway and embraces the Canal Street station of the Broadway-Lexington Avenue line and also the underlying portion of the Canal Street crosstown subway.

Franchise Desired for Crosstown Line in Chicago.—The Chicago City Railway has applied to the City Council of Chicago for permission to extend its Seventy-fifth Street line north on Eggleston Avenue to Seventy-fourth Street, west on Seventy-fourth Street to Ashland Avenue and south on Ashland Avenue to Seventy-ninth Street. The extension will include approximately 4 miles of single track which will be used for a crosstown transfer line. The ordinance will be carried over to March 11, when final action in regard to it will probably be taken by the Council.

Oakwood Street Railway Carhouse Fire.—The fire which destroyed the carhouse of the Oakwood Street Railway, Dayton, Ohio, as mentioned in the Electric Railway Journal of Feb. 3, page 295, was discovered about 5 a. m. As this company transports many workmen employed at the National Cash Register Company's plant a number of extra crews were reporting for duty along with the men who operate the regular cars. At the time the fire started all the cars were in the building, but only three were seriously damaged by the fire, although the company has no trained fire crew at this carhouse and all cars had to take a common ladder track on leaving the building. The fire loss included three cars as mentioned before, all the machinery used in car maintenance, a stock of car repair parts and the building. The loss is estimated at $60,000. No insurance was carried on the building and contents, but the cars were fully covered. The company will construct a new shop and carhouse on property which it acquired recently.

Subway Test Case in New York.—The Supreme Court in Brooklyn will hear three applications for an injunction against the Public Service Commission for the First District involving the legality of the form of contract to be made by the city for the operation of the new subway system. One of the suits was brought by John R. Ryon, another by the Admiral Realty Company and the third by John J. Hopper. All of the suits are along the same lines and ask the court to restrain the commission from entering into a contract with the Interborough Rapid Transit Company or the Brooklyn Rapid Transit Company which

shall provide for the payment to the operating company, out of earnings, of a certain sum of money before the city is allowed to take from the earnings the proper rate upon its investment. Such a preferential payment, so called, is declared by the applicants to be in violation of that provision of the constitution which forbids the city to loan its credit in aid of any private corporation. This litigation will be a test case and will be prosecuted to the Court of Appeals.

Decisions and Opinions of New York Commission for the First District.—The Public Service Commission for the First District of New York has begun the publication of an official series of reports of its opinions and decisions, in pamphlet "advance sheets" and bound volumes, in style similar to the law reports containing the decisions of the courts. Whenever any action of the commission is passed upon judicially the opinion or memorandum handed down by the court will be set out in full. The advance sheet pamphlets will appear about the first of each month, embodying the opinions adopted during the preceding month. Advance sheets have been prepared covering the opinions from Jan. 1, 1912. Pamphlets will not be issued for opinions prior to that date, but two bound volumes, containing the opinions adopted from July 1, 1907, when the commission took office, up to the date mentioned, will shortly be published. Two dollars will be charged for each bound volume, which will include the advance sheets therefor as issued. The advance sheet pamphlets will be sold separately at 25 cents each. Bound Volumes 1 and 2, comprising the decisions prior to Jan. 1, 1912, are $1.50 each.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

MASSACHUSETTS

Hearings were concluded on March 5 on the several bills to require the standard-gage steam railroads which enter Boston to electrify their systems within the metropolitan district. A résumé of the discussion before the committee on railroads is given in another column. The committee on street railways has voted leave to withdraw the bill to require the Bay State Street Railway to issue free transfers on certain of its lines in Quincy. Bills of this character have received little favor of late years in the committee, on account of the jurisdiction exercised by the Railroad Commission over fares and service. The House has passed to be engrossed a resolve which provides for an investigation and report by the Boston Transit Commission of the cost of extending the projected Dorchester subway from the present legally authorized terminus at Andrew Square to Codman Square, to give improved transit facilities to the Milton and Ashmont districts. The committee on street railways has sent in an adverse report on the bill to require the Boston Elevated Railway to maintain sanitary stations at all elevated and subway stations on its lines. The bill to authorize the Boston, Revere Beach & Lynn Railroad to acquire the Point Shirley Street Railway has been enacted and laid before the Governor. Both branches have accepted the adverse report of the committee on street railways on the bill to require the Boston subways to be kept open all night. An adverse report has also been received on the bill to require the construction of underground foot passages between the Washington Street tunnel and Tremont Street subway, which are substantially parallel and a block apart at Boylston Street, Boston. The bill to require the removal of the elevated structure between the North Station and Sullivan Square, Boston, has been adversely reported upon by the metropolitan affairs committee. The committee on railroads has reported the bill to give the Railroad Commission mandatory powers over the rates and equipment of the railroads of the State. The House has accepted the adverse report of the committee on railroads relative to the bill, which would provide for the public inspection of the recommendations of the Railroad Commission in case the board is of the opinion that the service, fares or equipment of the railways should be modified. Both branches have accepted the adverse report of the committee on street railways on the bill to require the street railways to maintain police protection at their passenger stations upon request of the municipal authorities. The committee on railroads has voted leave to withdraw the bill to provide for a determination of the value of shares of consolidated railroads and street railways, through the appointment of a commission in case of an appeal of stockholders. The petition of Mayor Fitzgerald, of Boston, for the construction of a subway in Huntington Avenue, Boston, in conjunction with the Boylston Street subway, has received an adverse report in committee and the latter has been accepted by the Senate.

NEW YORK

Senator Sullivan's bill directing the Public Service Commission of the First District of New York to report on the feasibility of removing the pillars which support the elevated tracks from the sidewalks in the Bowery, New York City, to the roadway in case the road builds a third track has passed the Assembly. The committee on railroads of the Assembly has favorably reported the Goldberg bill putting into immediate effect the order of the Public Service Commission restoring transfers in New York City. On March 5, however, the Goldberg bill was defeated on a motion for its advancement. A bill has been introduced in the Senate to amend the tax law in relation to the franchise tax on corporations. This is the same as the bill previously introduced in the Assembly. A bill has been introduced in the Senate to extend the authority of the Public Service Commissions to water-works corporations and municipalities owning or operating water works. A bill has been introduced in the Assembly to insert in the railroad law a new section which would provide that in cities of 1,000,000 inhabitants at least one guard shall be employed at each entrance to a subway or elevated car at all times when the door is open for the admission or discharge of passengers at any station.

RHODE ISLAND

An act creating a state public utilities commission and giving it authority in the regulation of all manner of public service corporations and companies, has been introduced in the Rhode Island House. The commission is to consist of three members, the salary of the chairman to be $4,000, and of the other members $3,500. The terms are for six years each. If the commission finds that unreasonable fares or rates are being charged, it may determine and by order fix reasonable charges to be followed in the future. Appointments to the commission are to be made by the Governor, with the advice and consent of the Senate, during the present session of the Assembly, and within ten days after the passage of the act. One of the appointees shall hold office until February, 1918, another until February, 1916, and the third until February, 1914, or terms of six, four and two years respectively. It is further provided that in January, 1914, and in January of each second year thereafter, the Governor, with the advice and consent of the Senate, shall appoint one member to the commission to hold office until the first day of February in the sixth year after his appointment, to succeed the member whose term will next expire. The first chairman is to be designated by the Governor, but thereafter the members of the comission are to elect their own chairman from one of their number, whenever any commissioner is appointed for a new term or whenever a vacancy shall occur in the office of chairman. The measure appropriates $11,000 for salaries of the commissioners, the chairman to get $4,000 and the other commissioners $3,500. In addition to this sum the commission is allowed $5,000 for clerical assistance and other expenses. The Attorney General is to be the legal representative of the commission in all cases, and provision is made for appeal to the Supreme Court from the decisions of the commission.

PROGRAM OF ASSOCIATION MEETINGS

Central Electric Railway Association

The following program has been announced for the regular quarterly meeting of the Central Electric Railway Association which is to be held in the palm room of the Claypool Hotel, Indianapolis, Ind., on April 4, 1912:

Business session and reports of special committees.

Report of committee on rules governing the cutting out of high-tension wires.

Report of standardization committee, deferred from the meeting of Jan. 18, 1912.

Discussion of paper, "Lightning Protection," read at

Louisville meeting by E. J. Burdick, superintendent of power of the Detroit (Mich.) United Railway.

Paper, "Methods of Prevention of Fire Hazards," by F. R. Daniels, inspecting engineer of the Indiana Fire Insurance Bureau, Indianapolis, Ind.

Discussion.

Paper, "The Maintenance of Electric Railway Equipment," by J. L. Crouse, of the engineering department of the Westinghouse Electric & Manufacturing Company.

Discussion.

The session will commence at 9 a. m.

New England Street Railway Club

The twelfth annual meeting and banquet of the New England Street Railway Club will be held at Boston, Mass., on Tuesday, March 19, 1912, the annual meeting in the afternoon and the banquet at 6.30 p. m. at the Hotel Somerset. The toastmaster will be Asa P. French, United States district attorney, and the after-dinner speakers will be President Taft, Eugene N. Foss, Governor of Massachusetts; Judson C. Clements, Interstate Commerce Commission; Thomas N. McCarter, president of the American Electric Railway Association and the Public Service Corporation of New Jersey; Frederick J. Macleod, chairman of the Board of Railroad Commissioners; Patrick Calhoun, president of the United Railroads of San Francisco, and Frank P. Bennett, Jr., Massachusetts State Senator.

Applications for reserved seats should be made to John J. Lane, secretary of the club, 12 Pearl Street, Boston, Mass., not later than March 12. The price of the banquet tickets to members or their guests is $3 each and members will be permitted to purchase tickets for guests until the committee feels that this is being done to the exclusion of the members. The request is made that the names of all who are to use tickets be furnished to the secretary of the club, so that the possibility of confusion in assigning tables will be avoided.

Missouri Electric, Gas, Street Railway & Water Works Association

The following program has been announced for the sixth annual convention of the Missouri Electric, Gas, Street Railway & Water Works Association, to be held at the Connor Hotel, Joplin, Mo., on April 11, 12 and 13, 1912:

THURSDAY, APRIL 11.

9:00 a. m.—Executive session.

9:30 a. m.—Address of welcome.

Response—T. E. Murray, president.

1:30 p. m.—Paper, "Power Development of Lead and Zinc District in Southwest Missouri," by R. A. McGregor of the Empire District Electrical Company, Joplin, Mo.

Paper, "Utility Power Factor Single Phase Motor," by F. N. Jewett of the Wagner Electric Company.

Paper, "Illustrated Talk on Keokuk Power Development in Mississippi River," by Hugh Cooper of the Mississippi Power Company, Keokuk, Ia.

7:30 p. m.—Rejuvenation of Sons of Jove.

FRIDAY, APRIL 12.

9:00 a. m.—Executive session.

Paper, "Electric Rates," by Herman H. Spohrer of the Union Electric Light & Power Company, St. Louis, Mo.

Paper, "Electric Pumping," by Prof. H. B. Shaw of Missouri University, Columbia, Mo.

Paper, "Lighting and Power in Rural Districts," by P. W. Markham of the Brookfield Gas & Electric Company.

1:30 p. m.—Paper, "Liability Insurance," by J. Q. Day of the St. Louis Service Company, St. Louis, Mo.

3:30 p. m.—Trip on special train to Empire District Electric Company's power plant at Riverton, Kan.

6:30 p. m.—Banquet at Connor Hotel.

SATURDAY, APRIL 13.

9:00 a. m.—Executive session.

9:30 a. m.—Paper, "Soliciting New Gas and Electric Business," by P. A. Bertrand of the Jefferson City Light, Heat & Power Company, Jefferson City, Mo.

11:00 a. m.—Trolley trip around mining district in special train as guests of the Southwest Missouri Railway.

3:00 p. m.—Executive session.

Financial and Corporate

Stock and Money Markets

March 6, 1912.

The reaction in prices of securities in the New York stock market which set in on the afternoon of March 5 continued to-day and the volume of business diminished materially. The reaction in prices, however, was not great enough to be regarded as anything more than a normal setback after a fairly substantial rise in the price of a number of stocks. Rates in the money market were: Call, 2@2½ per cent; thirty days, 2¾@3 per cent; sixty days, 3⅛@3¼ per cent; ninety days, 3¼@3½ per cent.

In the Philadelphia market dealing was quiet and steady. The stocks of the Electric Storage Battery Company and Philadelphia Company declined slightly.

In the Chicago market the traction issues were not in evidence. While fractional declines were recorded generally, Commonwealth Edison advanced 2 points to 147.

In the Boston market sales were recorded of stock of the Boston Elevated and Massachusetts Electric issues.

In the Baltimore market there was considerable trading in the United Railways & Electric Company incomes, refunding 5s and 4s, with sales of the last totaling 42,000.

Quotations of traction and manufacturing securities as compared with last week follow:

	Feb. 28.	Mar. 6.
American Brake Shoe & Foundry (common)	a95½	a95½
American Brake Shoe & Foundry (preferred)	a132½	a135
American Cities Company (common)	*29¾	*29¾
American Cities Company (preferred)	*80½	*80½
American Light & Traction Company (common)	a309	a302
American Light & Traction Company (preferred)	a108	a109
American Railways Company	a45	a44¾
Aurora, Elgin & Chicago Railroad (common)	a43	a43
Aurora, Elgin & Chicago Railroad (preferred)	a87	a86½
Boston Elevated Railway	[illegible]	[illegible]
Boston Suburban Electric Companies (common)	a15	a15
Boston Suburban Electric Companies (preferred)	a76	a77½
Boston & Worcester Electric Companies (common)	a12½	a12½
Boston & Worcester Electric Companies (preferred)	a56	a56
Brooklyn Rapid Transit Company	78¼	80⅞
Capital Traction Company, Washington	a123½	a123⅞
Chicago City Railway	a190	a190
Chicago Elevated Railways (common)	a35½	a35
Chicago Elevated Railways (preferred)	a94	a94
Chicago Railways, ptcptg., ctf. 1	a98	a100
Chicago Railways, ptcptg., ctf. 2	a35	a34
Chicago Railways, ptcptg., ctf. 3	a93¼	a93⅜
Chicago Railways, ptcptg., cts. 4	a53¼	a51¼
Cincinnati Street Railway	a132½	a131
Cleveland Railway	a105½	a105½
Cleveland, Southwestern & Columbus Ry. (common)	*4	4¼
Cleveland, Southwestern & Columbus Ry. (preferred)	*33	33
Columbus Railway & Light Company	a85	a85
Columbus Railway (common)	a80	80
Columbus Railway (preferred)	a92½	92½
Dayton Street Railway (common)	a25	a25
Dayton Street Railway (preferred)	a101	a101
Denver & Northwestern Railway	*137	a135
Detroit United Railway	a70	a70
General Electric Company	160¼	163½
Georgia Railway & Electric Company (common)	a165	a165
Georgia Railway & Electric Company (preferred)	a87¾	a87¼
Interborough Metropolitan Company (common)	18¼	17⅞
Interborough Metropolitan Company (preferred)	58¼	57¼
International Traction Company, 4% bonds, rcts	*75	75
Indiana Union Traction Company	*9	a10
Kansas City Railway & Light Company (common)	a22½	a22
Kansas City Railway & Light Company (preferred)	a52	a50¾
Lake Shore Electric Railway (common)	*7	a6½
Lake Shore Electric Railway (1st preferred	*90	a90
Lake Shore Electric Railway [illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	a138½
Massachusetts Electric Companies (common)	a22	a21½
Massachusetts Electric Companies (preferred)	a97	a97
Milwaukee Electric Railway & Light (preferred)	105	105
Norfolk Railway & Light Company	*26	a27
North American Company	78¾	a79¼
Northern Ohio Light & Traction Company (common)	a62	a57½
Northern Ohio Light & Traction Company (preferred)	a105	a101
Philadelphia Company, Pittsburgh (preferred)	a53½	a53¾
Philadelphia Company, Pittsburgh (common)	a44	a44
Philadelphia Rapid Transit Company	a23¼	a23⅓
Portland Railway, Light & Power Company	*70¼	a71½
Public Service Corporation	108	a108½
Seattle Electric Company (common)	118	118
Seattle Electric Company (preferred)	103	103
Third Avenue Railway, New York	42½	a44
Toledo Railways & Light Company	5	a3¼
Twin City Rapid Transit Co., Minneapolis (common)	108½	a108
United Rys. & Electric Company (Baltimore)	20½	20½
United Rys. Inv. Co. (common)	a35½	a35
United Rys. Inv. Co. (preferred)	a63	a63
Virginia Railway & Power Company (common)	a47	a46½
Virginia Railway & Power Company (preferred)	a88½	a88½
Washington Ry. & Electric Company (common)	*72½	a74½
Washington Ry. & Electric Company (preferred)	*94	a92⅝
West End Street Railway, Boston (common)	a88¾	a88¾
West End Street Railway, Boston (preferred)	a102	a102
Westinghouse Elec. & Mfg. Co.	a73⅝	a74
Westinghouse Elec. & Mfg. Co. (1st pref.)	a118½	a120¼

*Last sale. a Asked.

ANNUAL REPORTS

Pennsylvania Railroad

The annual report of the Pennsylvania Railroad for the calendar year 1911 contains a little information in reference to electrification and terminal matters. President James McCrea says in part in his general remarks to shareholders:

"Taxes, which have been continually increasing in the last few years, show a further increase for the year of $451,333, due principally to the taxes paid on the completed New York tunnel extension.

"The improvement of the company's passenger facilities in the city of Philadelphia, the necessity for which was explained in the last annual report, has had most careful consideration during the year, and the board of directors have about concluded that it should be accomplished by increasing the tracks and platforms and enlarging the station facilities at the Broad Street station and the North Philadelphia station.

"Consideration is also being given to the separation of through and local train traffic at the Broad Street station, and as to whether the electrification of some of its suburban lines would not afford material relief at that terminal. This decision will be announced when the studies now being made by the experts have been concluded.

"The Pennsylvania Tunnel & Terminal Railroad Company has issued its certificate of indebtedness for $84,861,420 to this company in settlement for the construction of the New York tunnel extension and station, including $1,896,004 advanced to that company during the year 1911 for the completion of its railroad. This certificate and $15,000,000 of its full paid capital stock are included in the detailed list of securities owned by this company and are carried on the balance sheet at valuations, respectively, of $57,461,419 and $1. The balance of its capital stock, namely, $10,000,000, is owned by the Pennsylvania Company.

"This company has received a note for $107,111 from the New York Connecting Railroad Company to cover advances made to the latter during the year.

"The New York Connecting Railroad Company—the capital stock of which has been owned for many years one-half each by this company and the New York, New Haven & Hartford Railroad—is constructing a railroad from a connection with the Long Island Railroad, near the boundary line between the boroughs of Brooklyn and Queens, New York City, through the latter borough to and over the East River and Randall's and Ward's Islands, to a connection with the New York, New Haven & Hartford Railroad near Port Morris, in the borough of the Bronx, and also a connection from the main line to the New York tunnel extension in Sunnyside yard, Long Island City. Contracts have been awarded for the steel work for the East River bridge and its viaducts and approaches on the north into the Bronx and on the south into the borough of Queens, Long Island.

"Upon the completion of the railroad, and the exercise of trackage rights to be obtained from the Long Island Railroad between the connection and its Bay Ridge terminals on New York harbor, the freight traffic interchanged between the Pennsylvania and New Haven systems, now transported by floats between the Pennsylvania terminals on the west side of the Hudson River and the New York, New Haven & Hartford Railroad lines at Port Morris—a distance of about 14 miles—will be floated from Greenville, N. J., to Bay Ridge, L. I.—a distance of about 3½ miles—and thence moved by rail to Port Morris. The connection with the tunnel extension will permit a direct all-rail movement via the Pennsylvania station, New York City, for the passenger traffic interchanged between the two systems. The New York connecting route will materially increase the facilities for and expedite the movement of the New England passenger and freight traffic, and will avoid congestion of the New York terminals and harbor and the delays which often arise in float service due to fog, ice, tides and the crowded conditions of the rivers.

"About three years will be required to construct the New York Connecting Railroad, including its East River bridge and viaducts, and the cost thereof—estimated at about $15,000,000, in addition to the $5,000,000 previously advanced in equal amounts by the two owning companies and represented by its capital stock and notes—will be provided for through an issue of its securities. The principal and interest of these securities will be guaranteed by this company and the New York, New Haven & Hartford Railroad, and the line operated pursuant to an agreement between the two companies, under which they will participate in its profits or meet its deficits."

Twin City Rapid Transit Company

The annual report of the Twin City Rapid Transit Company of Minneapolis, Minn., for the calendar year 1911 compares with 1910 as follows:

	1911.	1910.
Revenue from transportation	$7,749,158	$7,481,696
Revenue from operation other than transportation	62,035	49,952
	$7,811,193	$7,531,648
Maintenance of way and structure	$358,606	$316,766
Maintenance of equipment	380,270	373,065
Traffic expenses	42,804	49,414
Conducting transportation	2,470,401	2,323,577
General and miscellaneous	654,635	604,880
Total operating expense	$3,906,716	$3,667,702
Net revenue	$3,904,477	$3,863,946
Interest on debt and taxes	1,486,129	1,466,394
Surplus available for dividends and depreciation	$2,418,348	$2,397,552
Dividends preferred stock	$210,000	$210,000
Dividends common stock	1,206,000	1,206,000
Total dividends	$1,416,000	$1,416,000
Surplus from operation	$1,002,348	$981,552
Appropriated for renewals	750,000	736,000
Income account, surplus	$252,348	$245,552
Per cent total operating (including taxes and renewal appropriations) to total revenue	65.96	64.77

In his statement to stockholders C. G. Goodrich, the president, says:

"By comparison with the previous year, it will be shown that the gross earnings increased $279,545, or 3.71 per cent. The operating expenses increased $239,014, or 6.52 per cent. The net earnings increased $40,531, or 1.05 per cent.

"The increase in operating expenses is largely the result of continued extremely low flow of water in the Mississippi River throughout the entire year and an increase in trainmen's wages. The stage of water in the Mississippi River has been the lowest since the United States government records have been kept. Unusually heavy rainfalls during the fall months of 1911 and equally heavy snowfall so far this winter give promise of much improvement in the flow of the river during 1912.

"The sum of $750,000 has been appropriated from surplus for the year and added to the renewal fund.

"Interest on invested renewal fund amounting to $58,000 has also been added to the renewal fund.

"The balance sheet shows $2,495,109 in the renewal fund, of which amount $1,173,500 is invested in the consolidated mortgage bonds of your companies.

"The balance of the fund has been expended on the property, thereby making it unnecessary during the past two years to issue additional stock or bonds.

"It is believed the future will fully demonstrate the wisdom of providing as adequately as the earnings of your company will permit for renewal and depreciation of the property, thus insuring as far as possible the soundness and permanency of your investment.

"The insurance fund has been increased during the year by the sum of $30,332.

"The sum of $957,512 has been expended in new construction during the year, distributed as follows: New power, $453,312; new shops and tools, $59,509; car houses, $130,780; car equipment, $122,285; track and paving, $180,590; real estate, buildings, miscellaneous, $11,036.

"During the year the sum of $245,183 has been expended for renewals."

Traffic during the last two years compared as follows:

	1911.	1910.
Revenue passengers carried	154,380,730	146,980,553
Transfers redeemed	51,844,378	48,813,577

Michigan United Traction Company Elects Officers

The Michigan United Traction Company, which has been formed to lease the property of the Michigan United Railways, as noted in the ELECTRIC RAILWAY JOURNAL of March 2, 1912, page 368, has perfected its organization and elected the

following officers: President, B. C. Cobb, of Hodenpyl, Hardy & Company, New York; vice-president, Frank Silliman, of E. W. Clark & Company, Philadelphia; second vice-president and general manager, John F. Collins, formerly assistant general manager of the Toledo Railways & Light Company; secretary, Robert Morrison, formerly secretary, treasurer and auditor of the Michigan United Railways; treasurer, John W. Glendenning, formerly treasurer and general freight and passenger agent of the Saginaw-Bay City Railway; S. E. Wolff, New York, N. Y., assistant secretary and assistant treasurer; B. C. Cobb, George E. Hardy, C. M. Clark, Frank Silliman, W. A. Foote, John F. Collins, A. W. McLimont, George G. Moore, T. W. Atwood, B. F. Davis and John C. Weadock, directors.

The Michigan Railway Engineering Company, formed to improve the property of the Michigan United Traction Company and build the extensions to that system which are proposed, has organized as follows: W. A. Foote, president; A. W. McLimont, vice-president; George B. Dobbins, secretary-treasurer; S. E. Wolff, assistant secretary and treasurer; W. A. Foote, A. W. McLimont, George B. Dobbins, B. C. Cobb and Frank Silliman, directors.

Alabama Traction, Light & Power Company, Ltd., Montgomery, Ala.—It is understood that Parr's Bank, Ltd., London, Eng., is receiving advance applications on behalf of the purchasing syndicate represented by Sperling & Company for $6,000,000 of 5 per cent fifty-year gold bonds of the Alabama Traction, Light & Power Company, Ltd., at £90 per $500 bond. The authorized capital stock of the company is $30,000,000, of which $5,000,000 is 6 per cent cumulative preferred stock and $25,000,000 common stock. Of this amount $1,000,000 of preferred and $12,000,000 of common stock has been issued. There is also an authorized issue of $25,000,000 of fifty-year 5 per cent bonds, of which there is outstanding $10,000,000. The company was organized in Canada on Jan. 5, 1912, to acquire and operate hydroelectric power plants and to supply electricity for light, power and heat to Birmingham, Montgomery, Mobile and other important places in Alabama and to build, acquire and operate lighting and tramway systems generally. The company owns more than 99 per cent of the bonds and capital stock of the Birmingham, Montgomery & Gulf Power Company, which, it is said, possesses a very liberal charter granted in 1900 by the State of Alabama.

Algiers Railway & Lighting Company, New Orleans, La.—The deal transferring the property of the Algiers Railway & Lighting Company to the Canadian syndicate that owns the New Orleans, Southern & Grand Isle Railroad was completed on March 1, 1912, and the property will pass to the New Orleans & Grand Isle Traction, Light & Power Company, incorporated in Ontario on March 1, 1912, with a capital stock of $10,000,000. C. E. A. Carr, general manager of the Algiers Railway & Lighting Company and the New Orleans, Southern & Grand Isle Railway, says that no definite plan for the improvement of the property will be decided upon until the property is formally transferred.

County Traction Company, Chicago, Ill.—Emil G. Schmidt, president of the County Traction Company, was the highest bidder at the recent judicial sale of the Yerkes interests in the Suburban Railroad and its subsidiary, the Chicago, Riverside & La Grange Railroad. The consideration was $300,000. All claims owned by the Charles T. Yerkes estate were disposed of, the sale including the transfer of 1224 first mortgage 5 per cent gold bonds of the Suburban Railroad, various notes dated prior to 1903, and fifty shares of stock in the Chicago, Riverside & La Grange, as well as notes on that road amounting to $14,000 dated 1903. The County Traction Company will exchange transfers with the Suburban Railroad as soon as the former obtains satisfactory franchises.

Indianapolis, New Castle & Toledo Electric Railway, Indianapolis, Ind.—Richard W. Ruffin, Boston, has brought suit in the Superior Court at Indianapolis to enforce a contract for the sale of the property of the Indianapolis, New Castle & Toledo Electric Railway to him. He says that D. M. Parry and William E. Stevenson entered into a contract to sell the road to him on Feb. 20, 1912, by which he was to pay them $900,000, including the payment of the liens and indebtedness against the property. The road is now in the hands of a receiver and the sale at foreclosure has been ordered by the court.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—R. E. Breed, A. W. Burchard, Leighton Calkins, G. A. Golliver, Samuel McRoberts, H. W. Wehrhare and Harrison Williams, New York, N. Y., have all been elected additional directors of the Mahoning & Shenango Railway & Light Company.

New Jersey & Pennsylvania Traction Company, Trenton, N. J.—Alfred Reed, Trenton, N. J., and S. L. Wright, Philadelphia, Pa., were appointed temporary receivers of the New Jersey & Pennsylvania Traction Company on Feb. 29, 1912, on the application of Hugh H. Harrison, Frank Battles and George S. Hayes, Philadelphia, trading as Battles & Company; W. F. Snyder, S. L. Wright and W. R. Wright, Philadelphia, and John Barbey, Reading, Pa. The purchase of the property of the New Jersey & Pennsylvania Traction Company by Battles & Company was noted in the Electric Railway Journal of Feb. 17, 1912, page 288.

New York (N. Y.) Railways.—Having already approved the plan of reorganization of the Metropolitan Street Railway system, the Public Service Commission of the First District gave its approval on Feb. 27, 1912, to the mortgages proposed to be issued by the reorganized company, known as the New York Railways. These mortgages were a first real estate and refunding mortgage to the Guaranty Trust Company, New York, N. Y., to secure $16,768,100 in 4 per cent gold bonds, running thirty years, and an adjustment mortgage to the Farmers' Loan & Trust Company to secure $53,000,000 in 5 per cent gold bonds, running thirty years. As it is proposed to sell the bonds at a discount, the commission ordered the company to set aside a sinking fund of $108,000 each year to be invested at not less than 4 per cent, until the fund shall amount to $16,500,000, which the commission finds is the difference between the assets and the liabilities of the new company. It also ordered the company to set aside each year a depreciation fund amounting to at least 20 per cent of its gross operating revenue for each year.

Philadelphia & Easton Street Railway, Doylestown, Pa.—Friendly proceedings for the appointment of a receiver of the Philadelphia & Easton Street Railway have been instituted in the Common Pleas Court of Bucks County, at Doylestown. It is intended through the action to effect a reorganization of the company by which the capitalization can be reduced and the road put on a paying basis. Indebtedness of the company is set forth as a mortgage of $1,000,000 to the Girard Trust Company, Philadelphia, executed in 1907; an unsecured floating indebtedness of $7,297.72; promissory notes of $25,220, expended for cars and equipment; $1,993.41 tax on gross receipts due the State and $395.82 unpaid tax on capital stock.

Portland Railway, Light & Power Company, Portland, Ore.—Drexel & Company and E. W. Clark & Company, Philadelphia, Pa., and Lee, Higginson & Company, Boston, Mass., are offering $16,000,000 of first and refunding mortgage 5 per cent sinking fund gold bonds of the Portland Railway, Light & Power Company, dated Feb. 1, 1912, due Feb. 1, 1942. The bonds are coupon or fully registered, interchangeable. The denominations of the coupon bonds are $1,000, $500 and $100; registered, $1,000, $5,000, $10,000 and $50,000. They are callable as a whole after ten years, or for the sinking fund, at 105 and interest. The present $16,000,000 issue is at any time convertible at the holder's option into capital stock at a price equal to the amount paid in on the stock, plus $10 premium per $100 share.

Public Service Corporation of New Jersey, Newark, N. J.—It is stated that the Public Service Corporation has arranged to take over the Riverside Traction Company, the Elizabeth-Trenton Railway, the Cinnaminson Electric Power & Heating Company and the Bordentown Electric Light & Motor Company, under 999-year leases, subject to the sanction of the Public Utilities Commission.

Southern Traction Company of Texas, Dallas, Tex.—The Southern Traction Company of Texas, which proposes to build an electric railway from Dallas to Waco, has filed a mortgage for $5,000,000 in favor of the Union Trust Company, St. Louis, Mo., as trustee, to secure an issue of 5 per cent thirty-year bonds which have been disposed of through the William R. Compton Company, St. Louis, Mo.

Dividends Declared

Chicago (Ill.) City Railway, quarterly, 2¼ per cent.

Connecticut Valley Street Railway, Greenfield, Mass., 3 per cent, preferred.

Galveston-Houston Electric Company, Galveston, Tex., 3 per cent, preferred; 1½ per cent, common.

Louisville (Ky.) Traction Company, 2½ per cent, preferred; quarterly, 1 per cent, common.

Sao Paulo Tramway, Light & Power Company, Ltd., Sao Paulo, Brazil, quarterly, 2½ per cent.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, $3.

West Penn Traction Company, Pittsburgh, Pa., quarterly, 1 per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY.

Period.			Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1 m.,	Jan.	'12	*$53,448	*$25,993	$27,455	$15,762	$11,693
1 "	"	'11	45,176	*22,260	22,916	12,116	10,800
7 "	"	'12	384,913	*170,156	214,757	95,919	118,838
7 "	"	'11	355,508	*157,860	197,648	84,206	113,442

CHATTANOOGA RAILWAY & LIGHT COMPANY.

1 m.,	Jan.	'12	$81,004	*$48,091	$32,913	$21,269	$11,644
1 "	"	'11	73,533	*42,809	30,724	19,113	11,611

CLEVELAND, PAINESVILLE & EASTERN RAILROAD COMPANY.

1 m.,	Dec.	'11	$28,173	$15,591	$12,582	$8,750	$3,832
1 "	"	'10	27,234	14,647	12,587	7,947	4,639
12 "	"	'11	366,143	201,883	164,261	100,357	63,903
12 "	"	'10	355,469	185,202	170,267	96,585	73,682

EAST ST. LOUIS & SUBURBAN COMPANY.

1 m.,	Jan.	'12	$191,036	*$107,954	$83,082	$48,055	$35,027
1 "	"	'11	188,724	*103,010	85,714	45,236	40,478

GRAND RAPIDS RAILWAY, GRAND RAPIDS, MICH.

1 m.,	Jan.	'12	$97,448	*$54,660	$42,788	$14,790	$27,998
1 "	"	'11	92,067	*51,035	41,032	15,102	25,930

LAKE SHORE ELECTRIC RAILWAY SYSTEM.

1 m.,	Dec.	'11	$109,791	$60,821	$48,970	$34,375	$14,595
1 "	"	'10	95,571	52,640	42,930	34,703	8,228
12 "	"	'11	1,275,476	683,028	592,448	416,026	176,423
12 "	"	'10	1,206,112	632,533	573,579	417,050	156,529

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE.

1 m.,	Jan.	'12	$33,440	*$30,415	$3,025	$14,446	$11,421
1 "	"	'11	35,151	*26,834	8,317	13,107	4,790
7 "	"	'12	342,857	*204,583	138,274	101,151	37,123
7 "	"	'11	328,136	*197,126	131,010	91,845	39,165

MONTREAL STREET RAILWAY.

1 m.,	Jan.	'12	$417,962	*$267,370	$150,503	$45,764	$104,826
1 "	"	'11	370,125	*239,983	130,142	39,156	90,987
4 "	"	'12	1,711,770	*1,028,476	683,294	158,840	524,454
4 "	"	'11	1,500,185	*908,384	591,801	140,809	450,992

NORTHERN OHIO TRACTION & LIGHT COMPANY.

1 m.,	Jan.	'12	$186,272	$106,904	$79,368	$44,429	$34,938
1 "	"	'11	209,389	122,536	86,854	43,825	43,029

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1 m.,	Jan.	'12	$531,213	*$272,961	$258,252	$136,695	$121,557
1 "	"	'11	511,624	*270,613	241,011	123,509	117,502

PUGET SOUND ELECTRIC RAILWAY.

1 m.,	Dec.	'11	$147,789	$103,413	$44,376	$51,758	$7,382
1 "	"	'10	157,982	103,693	54,289	50,066	4,224
12 "	"	'11	1,766,742	1,203,658	563,085	607,579	44,494
12 "	"	'10	1,915,289	1,252,409	662,874	607,078	54,801

SAVANNAH ELECTRIC COMPANY.

1 m.,	Dec.	'11	$62,079	$43,128	$18,951	$18,700	$253
1 "	"	'10	53,515	36,017	17,498	17,481	17
12 "	"	'11	696,668	474,091	222,577	221,421	1,156
12 "	"	'10	632,356	416,234	216,122	215,012	1,110

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.

1 m.,	Jan.	'12	$102,541	*$55,980	$46,561	$19,626	$26,935
1 "	"	'11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SEATTLE ELECTRIC COMPANY.

1 m.,	Dec.	'11	$467,907	$261,250	$206,657	$115,406	$91,251
1 "	"	'10	493,843	260,802	233,041	107,452	125,589
12 "	"	'11	5,440,956	3,046,854	2,394,102	1,373,337	1,020,766
12 "	"	'10	5,588,189	3,212,789	2,375,400	1,307,330	1,068,070

TAMPA ELECTRIC COMPANY.

1 m.,	Dec.	'11	$66,391	$31,905	$34,485	$7,246	$27,240
1 "	"	'10	47,255	26,215	21,040	6,253	14,787
12 "	"	'11	691,323	358,163	333,160	78,845	254,315
12 "	"	'10	592,964	327,963	265,000	64,638	200,363

*Includes taxes.

Traffic and Transportation

Traffic Inquiry Proposed in Toronto

The Ontario Railway Board met in Toronto lately, but was unable to take any action in the case of the city against the Toronto Railway because the city had not appointed an expert to inquire into traffic conditions in Toronto. H. L. Drayton, K. C., corporation counsel, made a number of suggestions for temporary improvements. After sitting an hour, the board adjourned indefinitely to allow the Board of Control, on advice from Mr. Drayton, to appoint an expert who will make a general inquiry into conditions. His report will be submitted to the company officials some time before the next session of the board, in order that they can be in a position to say whether they can accede to the suggestions for alterations. Mr. Drayton said:

"The last adjournment of the court was to enable the city to get an expert with a view to deciding once and for all time what sort of a car system Toronto should have. It was also to determine where the suggested extra 200 cars should be routed and whether this number was sufficient in the opinion of the city or unreasonable in the opinion of the company. This report will be a finality, covering all the grounds and dealing with traffic generally and congestion at the different points. To get such information would take six or eight weeks of constant work and be somewhat expensive. I am sorry the expert is not yet chosen, but the matter is left in the hands of the Mayor and Comptrollers."

H. S. Osler for the company said:

"The moment Mr. Drayton is ready to make a specific set of suggestions we are willing to consider them. If it appears that there is a reasonable possibility of their doing some good we shall be perfectly willing to try them out."

He said he was disappointed that so much time would be taken up in getting the expert's report. He asked for a copy of the report before it was finally submitted.

Investigation of Service Conditions in Cincinnati

Attorney Nicholas Klien requested City Solicitor Bettman of Cincinnati to bring suit to terminate the franchise of the Cincinnati Traction Company on the ground that the service furnished by the company is inadequate. Mr. Bettman replied that he believed that it would be more desirable to have an expert investigate the service and make recommendations.

W. Kesley Schoepf, president of the Cincinnati Traction Company, announced that, commencing on March 1, 1912, members of the fire department in uniform would be carried free. The firemen requested this courtesy in order that they might live some distance away from the firehouses, as property owners who knew that they must live near the firehouses to which they were assigned were exacting excessive rents.

City Solicitor Bettman has called the attention of the Cincinnati, Newport & Covington Railway to the congested condition of the tracks on Fifth Street and the north track on Fourth Street and has asked that some plan be suggested for removing its cars from these thoroughfares. Mr. Bettman stated that the ordinance under which the company operates plainly contemplated that when the number of cars operated by the Cincinnati Traction Company and the Cincinnati, Newport & Covington Railway became sufficient in number to congest the tracks the latter should arrange to use other streets.

R. W. Harris, of the engineering staff of the Railroad Commission of Wisconsin, who has been engaged to investigate operating conditions in Cincinnati, arranged to begin his work the latter part of this week.

Re-routing in Los Angeles.—The Los Angeles (Cal.) Railway Corporation announced a number of changes in the routing of its cars effective on Feb. 25, 1912.

Accidents in New York in January.—The report of accidents on all railroads and street railways under the jurisdiction of the Public Service Commission for the First District for January showed fifteen persons killed during the month, which is the lowest number for one month reported since the commission was organized on July 1, 1907. The total number of accidents was 5,448.

Mirrors on Line at Louisville.—The Louisville & Southern Indiana Traction Company, operating in Louisville, Ky., and Jeffersonville and New Albany, Ind., has equipped the forward platform of every one of its cars with a small beveled mirror hung so as to give the motorman a clear view of the rear platform. This was done because the Indiana State Railroad Commission ruled recently that the conductor on an electric car must precede his car on a steam railroad crossing.

Reply to Complaint About Service in Albany, N. Y.—E. S. Fassett, general manager of the United Traction Company, Albany, N. Y., has filed a reply to thirty-nine specific subjects of complaint brought out at a hearing before the Public Service Commission of the Second District of New York on Feb. 6, 1912, and formally drawn up by the commission on Feb. 7. Mr. Fassett goes into some detail in regard to nearly all the complaints and explains that many of the matters complained of are in process of remedy and that practical reasons prevent action upon others.

I. C. C. Accident Report for Quarter.—Accident Bulletin No. 41, issued by the Interstate Commerce Commission for July, August and September, 1911, shows that ninety-eight persons were killed and 1094 injured as a result of the operation of electric railways engaged in interstate business and therefore subject to the regulations of the commission. This is a decrease of forty-eight in the number killed and an increase of 124 in the number injured as compared with the number reported for the same months of 1910. Ten persons were killed and 161 were injured in industrial accidents while in the service of electric railways.

"Near-Side" Stops in Louisville.—Since the plan of the Louisville (Ky.) Railway to have all cars stop only on the "near side" of street intersections went into effect, on March 1, 1912, only one well-grounded objection to the system has arisen. Residents of the suburban sections have complained that when cars stop on the "near side" of an intersection the entrance platform is often at a very muddy or rocky portion of the street. To eliminate this source of complaint, the railway officials are co-operating with the board of public safety in constructing crossings of crushed rock at points throughout the city where streets are not paved.

Maryland Electric Railways Answers Complaint.—The Maryland Electric Railways, through Griswold & Marshall, attorneys, has filed with the Public Service Commission of Maryland its answer to the complaint alleging discrimination in rates against certain stations along the Annapolis Short Line, referred to in the Electric Railway Journal of March 2, 1912, page 371. The company asserts that the rates are fair and that there is no discrimination. The statement is made that the company has not paid a dividend on its stock since the road was electrified. The service rendered, it is stated, is greater than the business of the road justifies.

Referendum in Opposition to Car-Fare Inquiry in Los Angeles.—Up to Feb. 23, 1912, about 20,000 persons had signed the referendum petitions against the ordinance empowering the Board of Public Utilities to regulate street car fares in Los Angeles. It was purposed to file the petitions on Feb. 26, 1912, so as to prevent the ordinance from going into effect on March 5, when it would become a law. The ordinance was adopted by the Council by a majority vote. Mayor Alexander said he believed the time was inopportune to pass the ordinance, but the ordinance later was adopted and Mayor Alexander signed it. Those who were instrumental in starting the referendum proceedings against the ordinance believe that if the law should become effective street railway extensions and development would be seriously handicapped and that business in general would suffer.

New York Companies to Submit Transfer Plan.—James L. Quackenbush, attorney for the New York (N. Y.) Railways, appeared before Commissioner Eustis, of the Public Service Commission of the First District of New York, on March 6, 1912, and stated that the officers of the company were at work on a transfer plan which might be feasible as far as the street railways in the borough of Manhattan were concerned and satisfactory enough for the commission to permit it to be tried for an experimental period. At the same time Mr. Quackenbush declared that it was impossible for the four companies, the New York Railways, the Third Avenue Railway, the Central Park, North & East River Railroad and the Second Avenue Railroad, to agree to the restoration of transfers as ordered by the commission at all the 151 points where they were once granted. Commissioner Eustis granted an adjournment for three weeks to give the companies more time to perfect their proposed plan and present it to the commission. Meanwhile the companies will not press the certiorari proceedings which they have filed in the Supreme Court against the commission.

Employees' Insurance and Pensions in Philadelphia.—The plan for employees' insurance by which a death benefit of $500 was paid to the families or beneficiaries of certain employees of the Philadelphia (Pa.) Rapid Transit Company has been extended so as to include all employees of the company more than twenty-one years old who have been in the continuous service of the company for two years prior to their death and were in receipt of compensation from the company not to exceed $200 per month. The company has paid $500 as death benefits to each of the families or beneficiaries of fifty-four men during the last eight months. The plan for employees' pensions, by which a pension of $20 per month was paid to certain employees, has also been extended so as to include all employees of the company sixty-five years old who have completed twenty-five years of continuous service in the employ of the company and who are in receipt of compensation from the company not to exceed $200 per month. There are at this time forty-two men drawing pensions from the company under this arrangement.

Spokane Transportation Club.—The third anniversary of the Spokane Transportation Club was celebrated by a banquet and business meeting at the Spokane Hotel, on Feb. 23, 1912. The following members were elected as an executive committee for the ensuing year: Charles W. Colby, manager of the United Iron Works; H. C. Munson, general agent of the Oregon-Washington Railroad & Navigation Company; Stephen H. Brown, chief dispatcher of the Great Northern Railway; R. A. Willson, general superintendent of the Washington Water Power Company, and C. L. Bankson, purchasing agent of the Spokane & Inland Empire Railroad. At a meeting of the executive committee held on Feb. 26, 1912, in the offices of Waldo G. Paine, traffic manager of the Spokane & Inland Empire Railroad, the outgoing president, the following officers were chosen: Charles W. Colby, president; R. A. Willson, vice-president; H. C. Munson, second vice-president. It is expected that J. W. MacIntosh will be re-elected as secretary and treasurer. Plans were discussed for increasing the membership of the club, which includes many prominent railroad men and shippers.

Block Signals Ordered for Suburban Lines in Greater New York.—The Public Service Commission of the First District of New York has served on various electric railways an order for the installation of automatic electric block signals on single-track lines in suburban localities. The companies included in the order are the New York & Queens County Railway, the Long Island Electric Railway, the New York & Long Island Traction Company, the New York & North Shore Traction Company, the Marine Railway, the Ocean Electric Railway, the Pelham Park Railroad, the Richmond Light & Railroad Company and the Staten Island Midland Railway. The North Shore Traction Company is exempted from the requirements of the order so far as its temporary line from Tenth Street, Bayside, to Douglaston is concerned. The order requires automatic block signals at all turnouts and at all points where double tracks lead into single tracks. It is provided, however, that if a company gives satisfactory assurance of its intention to double-track any particular stretch of road within one year the commission will exempt the company from observing the order so far as that portion of road is concerned.

Decision in California Interchange Case.—The Railroad Commission of California has rendered a decision in regard to the question of the interchange of freight between the Northern Electric Railway, San Francisco, Cal., and the Western Pacific Railway. By the ruling of the commission

there may be an exchange of freight to and from points on the Northern Electric Railway north of Sacramento to points on the Western Pacific Railway south and west of Sacramento. Sacramento is made the transfer point, with the benefit of a common through rate. Without approving the reasonableness of the rates, the tariff of the Southern Pacific Company between like points is made the basis of the through rates to be made effective on the Western Pacific Railway and the Northern Electric Railway. The rates are to be divided between the carriers on a mileage pro rata basis, provided that the local rates of each company are the maximum of its division of the through rate. For the purpose of this mileage computation, the distance between Sacramento and San Francisco is fixed at 88.8 miles —what is known as the short-line mileage. Commissioner Loveland wrote the decision.

Helpful Hints for Traveling Men.—The Winona Interurban Railway, Warsaw, Ind., has issued a very interesting little vest-pocket book which it has introduced under the title "Helpful Hints for Traveling Men." The ideas which the company has sought to carry out are, perhaps, conveyed best by the dedicatory and introductory paragraphs which appear in the book and are as follows: "Dedicatory.—Being a little book intended for vest-pocket wear which we dedicate to 'His Highness, the Knight of the Grip,' trusting that the information contained between its two covers will be of real benefit to him and prove to be an invaluable aid as he travels over our lines." "Introductory.—In compiling the data herein found it has been our endeavor to pick facts that would be of actual use to a traveling man making the territory covered by Winona lines. Not only have we given information regarding all towns on our own system but also facts concerning those towns which lie on either side of it on steam roads and which can be reached by close connections via Winona Interurban. A list of the principal summer resorts, lakes and rivers easily reached from the various stations of the Winona Interurban has been included. On the last page will be found an outline of the various classes of tickets and rates of fare on sale at all Winona stations." Near the front of the publication there is a map showing the route of the Winona Interurban Railway and the routes of the steam railroads which connect with it.

Detroit Fare Case Before Court.—In the fare case brought by the city against the Detroit (Mich.) United Railway, Judge Hosmer decided that the only question involved was the interpretation of the law, and that there was nothing for a jury to decide. He set the hearing on the mandamus for March 4, when a full bench was expected to hear the arguments in the case. Fred A. Baker, who represented the company before the court, stated that the company is selling workingmen's tickets on the Jefferson line, good for a continuous ride to both the easterly and northwesterly city limits, and charging a single fare during certain hours of the day, because it wishes to save unpleasantness with the city, and that it has the right and intends to abolish the custom eventually. Mr. Baker was quoted as follows: "It is true the Supreme Court of Michigan did rule against us as far as the workingmen's tickets are concerned. We immediately appealed to the United States Supreme Court and the case will be decided in about a year. We have been giving the workingmen's tickets in obedience to the order of the Supreme Court simply to save unpleasantness with the city. This order is a temporary one, pending the appeal to the higher court, and we have never relinquished any of our claims. Now they are asking us to extend the 5-cent fare into this district. The city says in the seventeenth paragraph of its petition that the company has admitted as correct the construction of the ordinances to mean by 'city limits' any limits made by annexation or act of the Legislature. We never have admitted any such thing. We have been giving single fares of 5 cents on extensions into the townships on many of the lines, I will admit, simply because the original township grants provided for a 5-cent fare into the city. This is true of the lines extending into Hamtramck and Grosse Pointe, of the Woodward lines into Highland Park, and the Fort Street lines into Delray. The city cannot show a single case where the company has ever extended lines into a new territory on a single 5-cent fare except 200 ft. on Chene Street."

Personal Mention

Mr. C. H. Berry resigned as master mechanic of the Springfield (Ohio) Railway on March 1, 1912.

Mr. A. W. Clark has been appointed carhouse foreman of the Norwich & Westerly Traction Company, Norwich, Conn.

Mr. W. S. Townsend has resigned as electrical engineer of the Tri-State Railway & Electric Company, East Liverpool, Ohio.

Mr. Robert Peightal has been appointed superintendent of the Huntingdon, Lewistown & Juniata Valley Electric Company, Huntingdon, Pa., to succeed Mr. F. D. Shindel.

Mr. Ross Thompson, general manager and claim agent of the Aroostook Valley Railroad, Presque Isle, Maine, has been appointed chief engineer of the St. John & Quebec Railway, Fredericton, N. B.

Mr. H. L. Harding has been appointed acting assistant treasurer of the Galveston (Tex.) Electric Company to succeed Adrien Drouilhet, deceased. Mr. Harding was formerly assistant treasurer of the Houston (Tex.) Electric Company.

Mr. F. D. Shindel has resigned as superintendent and electrical engineer of the Huntingdon, Lewistown & Juniata Valley Electric Company, Huntingdon, Pa., to become connected with the Lehigh Valley Transit Company, Allentown, Pa.

Mr. W. I. Shelp has resigned as auditor of the Tri-State Railway & Electric Company, East Liverpool, Ohio, on account of the failure of his health. The duties of his office are being performed temporarily by the traveling auditor of the company.

Mr. C. E. Willeck, Pittsburgh, Pa., has been elected president of the Cleveland & Erie Railway, Girard, Pa., to succeed Mr. Robert W. Watson, New York, N. Y., resigned. Mr. Watson is vice-president of the Fort Wayne & Northern Indiana Traction Company and retired from the Cleveland & Erie Railway on account of the pressure of his other duties. Mr. Willeck is treasurer of the Fidelity Trust Company, Pittsburgh, Pa.

Mr. Harry M. Steward, roadmaster of the elevated division of the Boston (Mass.) Elevated Railway, has been appointed to the new office of chief engineer of maintenance of way, with supervision over the present departments of civil engineering and maintenance of way of surface and elevated lines. Mr. Steward was born in Skowhegan, Maine, and prior to his connection with the Boston Elevated Railway had an extended experience in the engineering and road departments of the Boston & Maine Railroad. He has been roadmaster of the elevated division of the Boston Elevated Railway since Oct. 1, 1903, and is widely known as an authority on rail wear, having written articles upon this topic which have had a wide circulation in this country and abroad.

Mr. John H. Marble, who has been special counsel in the Lorimer case, acting for the Senate committee on privileges and elections, on Feb. 24, 1912, assumed his duties as secretary of the Interstate Commerce Commission, to which position he was appointed in July, 1911. Mr. Marble is a native of Nebraska and a graduate of the University of Nebraska. Prior to his appointment as chief of the division of prosecutions of the Interstate Commerce Commission he had been for some time a resident of California. He has been identified with many of the important investigations of the commission, recently in the investigation into the matter of substitution in tonnage at transit points and as attorney for the commission in the tap-line inquiry. In June, 1911, he was selected as counsel for the Senate investigating committee on the Lorimer case.

Mr. Richard T. Laffin has been elected vice-president of the newly organized Puget Sound Traction, Light & Power Company, Seattle, Wash., which has been incorporated in the interests of Stone & Webster, Boston, Mass., to effect a merger of the properties which they manage in the Puget Sound district, as referred to in the Electric Railway Journal for Jan. 27, page 177. Mr. Laffin was for

many years connected with the Boston (Mass.) Elevated Railway and was later general manager of the Worcester (Mass.) Consolidated Street Railway. He resigned from the latter company to become vice-president and general manager of the Manila Electric Railroad & Light Company, Manila, P. I., and spent about four years in the Philippines. In 1909 Mr. Laffin became associated with the Stone & Webster Management Association, Boston, Mass., in connection with the Seattle Electric Company and other Puget Sound railway and lighting properties.

Mr. Frederick N. Bushnell, who has been engineering manager of the Stone & Webster Engineering Corporation, Boston, Mass., since August, 1909, has been elected vice-president of that corporation, effective on April 1, 1912. Mr. Bushnell joined the staff of Stone & Webster in February, 1907, taking charge of the construction of the Lincoln, Harvard and Charlestown power stations of the Boston Elevated Railway. Before becoming connected with Stone & Webster, Mr. Bushnell was chief engineer of the Rhode Island Company, Providence, R. I. He settled in Providence about twenty-eight years ago and received his early mechanical training with the Providence Steam Engine Company, filling various position in the shop and drawing room and finally becoming designing engineer in 1889. He then spent a year at Chester, Pa., but returned to the Providence Engineering Works as general superintendent in 1891. In 1893 he left the company to take up the building of the improved Green engine at the Fuller Iron Works in Providence, but this project had to be abandoned owing to financial troubles which occurred in the spring of that year. Mr. Bushnell next became chief engineer of the Narragansett Electric Light Company and in 1901 also became chief mechanical engineer for the United Traction & Electric Company, which controlled all of the electric railways in Providence, Pawtucket and the surrounding towns. When these street railway properties at Providence were purchased by the United Gas & Improvement Company, Philadelphia, Pa., in 1902, Mr. Bushnell was appointed chief engineer of the entire system, which is now operated by the Rhode Island Company.

Mr. Franz von Schilling, who for the last year has been acting general manager of the Newport News & Old Point Railway & Electric Company, Newport News, Va., and its subsidiary lines, resigned recently from the company to become connected on March 4, 1912, with the office of the president of the Virginia Railway & Power Company, operating in Richmond, Norfolk and Portsmouth. Mr. von Schilling has been in the employ of the Newport News & Old Point Railway & Electric Company since 1898. He first took the position of collector with the Chesapeake Light Company in Newport News in the ice department in 1896. When this company was taken over by Mr. W. J. Payne and his associates, Mr. von Schilling came to the Hampton office as clerk and was later advanced to chief clerk under Mr. Segar Whiting, who at that time was auditor. When Mr. Whiting resigned, in 1899, Mr. von Schilling was made the general auditor and later when Mr. Payne purchased the property of the Citizens' Railway & Electric Company and the Gas Company of Newport News he was made the general auditor for all the subsidiary lines. Mr. von Schilling was general auditor of the consolidated street railways during the time that the Newport News & Old Point Railway & Electric Company and the Norfolk & Portsmouth Traction Company were conducted under one management. In February, 1911, when Mr. W. W. S. Butler resigned as general manager of the company, Mr. von Schilling was made the acting general manager, which position he has since filled. A few days before he relinquished his duties with the Newport News & Old Point Railway & Electric Company a banquet was given to Mr. von Schilling at the Hotel Chamberlin, Newport News, by his friends, who presented him with a silver loving cup as a token of their esteem. The Newport News *Times-Herald* in commenting editorially on Mr. von Schilling's resignation said: "The gathering at the Hotel Chamberlin was a noble tribute to Mr. von Schilling. The occasion did honor to him and to his lifelong friends. Franz von Schilling needs no encomium or testimonial from a newspaper. The tribute which his lifelong and more recent friends paid him last night stamps him as a man of character."

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***South East Calgary Electric Railway, Calgary, Alta.**—Application for a charter has been made in Alberta by this company to build an electric railway from the Calgary city limits in a southeasterly direction to a point at or near Shepard. Capital stock, $250,000. Incorporators: D. W. Trotter, P. Burns, James Walker, W. H. McLaws, S. G. Gooch and Louis P. Strong, all of Calgary.

***New Orleans & Grand Island Traction, Light & Power Company, Ltd., New Orleans, La.**—Incorporated in Ontario with a capital stock of $10,000,000 and headquarters in Toronto to take over the Algiers Railway & Light Company.

***Frederick, Washington & Drum Point Railway, Frederick, Md.**—Application for a federal charter has been made at Washington, D. C., by this company in order to build an interurban railway from Frederick, Md., through the District of Columbia, and thence to Owings Station, Calvert County, and finally to Drum Point, a distance of about 100 miles. Capital stock, $10,000 to $1,000,000. Incorporators: Francis E. Baker, C. A. N. Wells, Richard N. Ryan, Charles C. Mayer, Reese Carpenter and C. Francis Owens.

***Pembroke, Red Springs & Northern Railroad, Raleigh, N. C.**—Chartered in North Carolina to build a railway between Pembroke and Red Springs. Capital stock, $75,000. Incorporators: J. L. McMillan, C. G. Vardell, J. G. Williams, J. D. McLean and Paisley McMillan, all of Red Springs.

***Quapaw-Lincolnville Railway, Oklahoma City, Okla.**—Application for a charter has been made in Oklahoma by this company to build a steam or electric railway between Lincolnville and Miami. Capital stock, $20,000. Incorporators: J. D. McIntyre, J. L. McCracken, M. H. McCracken and George D. Stein, all of Miami.

***Forest Hill Electric Railway, Toronto, Ont.**—Application for a charter has been made to the Legislature by this company to build an electric railway in Toronto.

***Brownsville Street & Interurban Railway, Brownsville, Tex.**—Application for a charter has been made in Texas by this company to build electric railways near Brownsville. Capital stock, $10,000. Incorporators: S. A. Robertson, San Benito; S. L. Dwerman, Brownsville, and H. L. Borden, Houston.

FRANCHISES

***Globe, Ariz.**—N. L. Amester, Boston, Mass., will construct an interurban electric railway between Globe and Miami.

***Contra Costa, Cal.**—R. E. Bousfield has asked the Board of Supervisors of Contra Costa County for a fifty-year franchise to build a single or double-track electric railway through Contra Costa County.

Fresno, Cal.—The Fresno Traction Company will ask the Board of Supervisors for a franchise for a right-of-way along its Olive Avenue extension, in Fresno.

Monterey, Cal.—George W. Phelps, representing the Del Monte Heights Railway, will ask the City Council for a franchise in Monterey. It is planned to extend the line from the terminus just outside the city limits of Monterey to the end of the Monterey & Pacific Grove Street Railway at the Del Monte Heights. A contract has been signed by the Monterey & Pacific Grove Street Railway for the use of rolling stock and for power for operation of the cars. Plans are also being made to build an amusement park at Del Monte Heights. [E. R. J., June 12, '09.]

Pomona, Cal.—The San Angelo Railway has asked the City Council for a franchise in Pomona.

San Mateo, Cal.—The United Railroads, San Francisco, will ask the City Board of Trustees for a franchise in San Mateo from the Third Avenue terminal to Sixteenth Avenue at the southern limits of the city.

Dalton, Ga.—The Chattanooga Traction Company has received a franchise from the City Council in Dalton. C. E. James is interested. [E. R. J., Feb. 17, '12.]

Centralia, Ill.—The Centralia & Central City Traction Company has asked the City Council for a twenty-five-year franchise over several streets in Centralia. Additional track will be laid outside the city to nearby industrial plants.

East St. Louis, Ill.—The East St. Louis Railway has asked the City Council for a franchise on Broadway over several streets to the east city limits of East St. Louis.

Cedar Rapids, Ia.—The Cedar Rapids & Iowa City Railway & Light Company has received a franchise from the City Council in Cedar Rapids for its extension from Cedar Rapids to Mount Vernon.

Ellisville, Ia.—The Laurel Light & Railway has asked the City Council for a franchise in Ellisville. The company plans to build an extension between Ellisville and Laurel.

West Branch, Ia.—The Davenport, Iowa City & Western Traction Company, Pierre, S. D., has asked the City Council for a franchise in West Branch from a point south of Main Street in a southeasterly direction across the town. This is part of a plan to build a 70-mile electric railway from Davenport to Iowa City with a branch to Tipton. C. E. Coon, Omaha, Neb., is interested.

New Bedford, Mass.—The Union Street Railway has asked the Board of Aldermen for a franchise to extend its Arnold Street line in New Bedford.

***Hempstead, N. Y.**—Edward C. Davis and associates have asked the Town Board for a franchise to build a street railway on South Franklin Street, Hempstead, and along the Baldwin road to Baldwin.

***Pelham Bay Park, N. Y.**—A resolution from Borough President Miller of the Bronx has been approved by the Board of Estimate, providing for the construction of a municipal surface line in Pelham Bay Park, if no better means could be found to operate a line there.

Dayton, Ohio.—The Ohio Electric Railway, Cincinnati, will ask the City Council for a twenty-five-year franchise on St. Clair Street in Dayton.

Berlin, Ont.—The Berlin & Bridgeport Electric Street Railway has received permission from the Town Council to extend its line to Elora, through Bloomingdale, West Montrose and Winterbourne.

***North Toronto, Ont.**—The Forest Hill Railway has asked the City Council for a franchise in North Toronto.

Corvallis, Ore.—The Oregon Electric Railway, Portland, has asked the City Council for a franchise in Corvallis.

***Ellwood City, Pa.**—The Beaver & Northern Street Railway, Ellwood City, will ask the City Council for a franchise in Ellwood City. It will connect Ellwood City and New Castle, Pa., and Poland, Ohio. Mr. Goehring, Zelienople, is interested.

West Chester, Pa.—The Philadelphia & West Chester Traction Company, Philadelphia, has received a franchise from the Borough Council to extend its tracks on North Walnut Street to the proposed new freight station in West Chester.

Chattanooga, Tenn.—The Chattanooga Traction Company has received a franchise from the Municipal Commissioners to extend its lines to Walden's Ridge and to the territory west of the city and across the Tennessee River. The line will be built to Dayton and Cleveland, Tenn., and to Dalton, Ga., out of Chattanooga. C. E. James is interested. [E. R. J., Feb. 17, '12.]

Rockwall, Tex.—The City Council of Rockwall has granted Joseph F. Nichols, Greenville, a fifty-year franchise for the use of certain streets by the proposed interurban electric line that he and his associates will construct from Dallas to Clarksville, via Rockwall, Royse, Greenville, Wolfe City, Cooper and Paris. [E. R. J., Feb. 24, '12.]

Salt Lake City, Utah.—The Utah & Salt Lake Electric Railway has asked the City Commission for a franchise in Salt Lake City. [E. R. J., Aug. 26, '11.]

***Richmond, Va.**—H. C. Cutting, president of the Point Richmond Land & Canal Company, will ask the City Council for a franchise to build an electric railway over Cutting Boulevard from the city limits to Richmond Avenue in Richmond.

Richmond, Va.—Mayor Richardson has approved the ordinance authorizing the Virginia Railway & Power Company to sell its Seven Pines franchise to the Richmond, Urbanna & Peninsula Railway, which proposes to construct a line to Urbanna with the Seven Pines line as a nucleus.

***Winchester, Va.**—M. M. Lynch, Winchester, has asked the City Council for a franchise in Winchester. A similar franchise has been asked of the City Council in Martinsburg.

Bellingham, Wash.—The British Columbia Electric Railway, Vancouver, will ask the City Council for a franchise in Bellingham.

Vancouver, Wash.—The Washington-Oregon Corporation, Vancouver, has received right-of-way from the government across the military reservation at Fifth Street in Vancouver.

TRACK AND ROADWAY

British Columbia Electric Railway, Vancouver, B. C.—The Saanich extension of the British Columbia Electric Railway will have its terminus at Deep Cove. A branch line will be built to Union Bay.

***Burrard, Westminster, Boundary Railway & Navigation Company, Vancouver, B. C.**—Plans are being made by this company to build an electric railway betweeen Vancouver and Mission City, via Barnaby and Hastings. Power will be obtained from the Western Canada Power Company. William McNeill, Vancouver, president.

Monterey-Del Monte Heights Interurban Railway, Monterey, Cal.—This company has placed in operation its 3-mile electric railway between Monterey and Del Monte Heights. It is expected to extend this line into Salinas and the Salinas Valley. George W. Phelps, president. [E. R. J., June 12, '09.]

Petaluma & Santa Rosa Railway, Petaluma, Cal.—Surveys are being made by this company to build a more direct line between Santa Rosa and Petaluma.

United Railroads, San Francisco, Cal.—Plans are being considered by this company for the construction of a network of lines in the Monterey Bay district.

Peninsular Railway, San José, Cal.—Work has been begun by this company on its line into Alum Rock Park.

Tidewater & Southern Railroad, Stockton, Cal.—Plans are being made by this company to extend its line to Fresno, via Madera.

Vallejo & Northern Railway, Vallejo, Cal.—A contract has been awarded by this company to the Hard Brothers Company, Sacramento, for the construction of the first section of its line. Work has been begun at Vallejo.

Sacramento Valley West Side Electric Railway, Willows, Cal.—This company has obtained the entire right-of-way for its line between Woodland and Red Bluff, via Willows, Corning, Orland and Redding. Arrangements have been completed for the immediate construction of the line. C. L. Donohue, Willows, president. [E. R. J., Dec. 30, '11.]

Pueblo & Suburban Traction & Lighting Company, Pueblo, Col.—This company has placed in operation two new lines in Pueblo. The City Park line, over 2 miles in length, gives the first line to the City Park and the other extension runs to Mineral Palace Park.

Connecticut Company, New Haven, Conn.—This company plans soon to build extensions of its lines in Milford, Orange and Waterbury.

Norwich, Colchester & Hartford Traction Company, Norwich, Conn.—Work will be resumed by this company about April 1 on its line between Hartford and Norwich. Most of the grading has been done as far as Hillstown. H. M. Pollock, secretary. [E. R. J., Jan. 14, '11.]

Valdosta (Ga.) Street Railway.—During the next few months this company will award contracts to build several miles of new track in Valdosta.

Chicago (Ill.) Railways.—This company plans to build 13.27 miles of track within the city limits during the year.

Hammond, Whiting & East Chicago Electric Railway, Chicago, Ill.—This company plans to build a line that will embrace the entire steel belt from Joliet to Gary and

include the manufacturing districts centering at South Chicago, Burnham, Hegewisch, Blue Island, Chicago Heights, Hammond, Whiting, East Chicago and Indiana Harbor. This company has bought the Chicago & Southern Traction Company, with 56 miles of interurban road from Seventy-ninth Street to Kankakee. Through the Harvey extension, which is to be built through from Hammond, the 30 miles of track which embrace the entire Calumet region in Indiana will be connected up with the great industrial district south of Chicago. In all the system will have 118 miles of track.

***Northern Illinois Traction Company, Chicago, Ill.**—It is reported that within a short time this company will apply for a charter to build an interurban railway between Chicago and Joliet.

Oil Belt Railroad, Oblong, Ill.—This company will build 74 miles of new track during the year. One extension will be from Mount Carmel to Bridgeport and the other branch from Oblong to Charleston.

Evansville & Southern Indiana Traction Company, Evansville, Ind.—This company is said to be considering plans to build an extension to New Harmony.

Kentucky Southwestern Railway, Light & Power Company, Hickman, Ky.—It is stated that financial backing has been secured and construction will soon be begun by this company on its line between Hickman and Paducah. H. C. Rodes is interested. [E. R. J., Feb. 24, '12.]

***Pittsfield, Maine.**—Citizens of Pittsfield and Canaan plan to build an electric railway from Pittsfield across Canaan to Hinckley, where a connection could be made with the proposed Shawmut & Skowhegan Electric Railway. The distance would be 16 to 20 miles, according to the route selected. The Kennebec River would be crossed at the new State bridge at Hinckley.

Aroostook Valley Railroad, Presque Isle, Maine.—During the year this company plans to build a 10-mile extension from Washburn westward toward Quebec Bridge.

Oak Bluffs (Mass.) Street Railway.—About ½ mile of track will be built in Oak Bluffs by this company in 1912.

***Eau Claire, Minn.**—Plans are being considered to build an electric railway from Eau Claire down the Waumandee Valley, via Gelmanton and Waumandee. E. A. Rau, manager of the Northwest Engineering & Construction Company, will make the preliminary surveys in the near future.

Hattiesburg (Miss.) Traction Company.—This company plans to build several extensions in Hattiesburg.

Interstate Railway, Kansas City, Mo.—This company advises that it will build about 48 miles of new track between Kansas City and St. Joseph during the year.

Ocean City (N. J.) Electric Railway.—This company advises that during the next two weeks it will award contracts to build 1,000 ft. of new track in Ocean City.

***Ilion (N. Y.) Street Railway.**—Preliminary surveys will soon be made by this company to build its Otsego Street line. E. L. Doty and H. L. Doty are interested.

Schenectady (N. Y.) Railway.—During the year this company plans to build 1.30 miles, covering loop around American Locomotive Works, and an extension of 800 ft. on Campbell Avenue, Schenectady.

Defiance (Ohio) Interurban Railway.—Work will be begun early in the summer by this company on its electric railway to connect Defiance, Ohio, and Fort Wayne, Ind., via Ashland, Emmett, Paulding, Cecil, Antwerp and New Haven. The line will be built along the tow-path of the old Erie Canal and the right-of-way, with the exception of 2 miles, is said to have been purchased by the promoters. K. V. Haymaker, Defiance, president. [E. R. J., Aug. 5, '11.]

Springfield & Xenia Railway, Springfield, Ohio.—Preliminary surveys for the proposed route of this company's extension from Yellow Springs to Dayton will soon be made.

Bartlesville (Okla.) Interurban Railway.—Contracts will soon be awarded by this company to build a 15-mile extension from Dewey to Copan and Cansy.

Shawnee (Okla.) Electric Railways.—During the year 40 miles of track will be built by this company from Shawnee to Oklahoma City, via McLoud, Harrah, Choctaw and Dixon.

London (Ont.) Street Railway.—This company will construct about 2 miles of new track in London during 1912.

Nipissing Central Railway, North Cobalt, Ont.—It is reported that this company will soon award contracts to build an extension from Haileybury, Ont., north along the shore of Temiscaminque Lake to New Liskeard, 5 miles. P. L. Utley, Escanaba, Mich., chief engineer.

Karwartha Transportation Company, Peterboro, Ont.—This company's bill for incorporation has passed the railway committee of the Ontario Legislature. This company will build electric railways in the Karwartha district, and one of the first lines to be built will be to connect Peterboro and Lakefield. [E. R. J., Feb. 17, '12.]

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—This company's lines will be extended from St. Catharines to Niagara-on-the-Lake on one side and to Jordan on the other, connection being made at Jordan with the main line of the Canadian Northern Railway.

Humber Valley Electric Railway, Toronto, Ont.—The plans submitted by R. Home Smith for the construction of this railway have been approved by the Etobicoke Council. It extends from Lambton, Etobicoke Township, to the lake shore in York. [E. R. J., Feb. 17, '12.]

Easton (Pa.) Transit Company.—This company has placed contracts for 2 miles of 60-lb. A. S. C. E. section rails, ¼ mile, with 90-lb. section rails, creosoted yellow pine ties, continuous joints and special work, all for renewals during 1912.

Lebanon & Campbelltown Street Railway, Lebanon, Pa.—Work will be resumed by this company during this month on its line between Campbelltown and Lebanon, via South Londonderry, South Annville and North Cornwall. The grading has been completed. M. S. Hershey, president. [E. R. J., Sept. 30, '11.]

Pottstown & Phoenixville Railway, Pottstown, Pa.—Plans are being made by this company to begin construction at once on its line between Spring City, Sanatoga and Pottstown. A route has been surveyed, which will extend through Linfield and Parkerford. George N. Malsberger, president. [E. R. J., Dec. 9, '11.]

Scranton & Binghamton Traction Company, Scranton, Pa.—This company has made an agreement with the Binghamton Railway for the use of the tracks and terminal facilities of that company at Binghamton.

Dallas (Tex.) Street Railway.—This company is relaying a considerable portion of its track in Dallas and making other improvements. It is also rebuilding the Highland Park line on Cole Avenue from Lemmon to Knox Street, a distance of about 1½ miles.

Southern Traction Company, Dallas, Tex.—It is reported that this company, which was formed to construct an interurban electric railway between Dallas and Waco, has been financed by the St. Louis Union Trust Company, G. H. Walker & Company and William R. Compton Company, St. Louis, Mo. The entire bond issue of $5,000,000 has been disposed of, it is stated. The survey for the proposed line is finished and the right-of-way is now being secured. The line will be about 100 miles long. J. F. Strickland, president. [E. R. J., Jan. 13, '12.]

Mineral Heights Traction Company, Greenville, Tex.—A certificate of dissolution has been filed by this company. [E. R. J., Aug. 26, '11.]

La Grange, Tex.—Temporary officials named at a meeting at Industry to consider plans for an interurban railway from Belleville to La Grange were C. J. Rosenberg, La Grange, president, and P. Wangermann, Belleville, secretary. It was decided to raise $1,000 for a preliminary survey. [E. R. J., Feb. 17, '12.]

Mineral Wells (Tex.) Electric Railway.—Work has been begun by this company on the extension in Mineral Wells from Oak Street to the passenger station.

Union Terminal Railway, Rockport, Tex.—This company plans to begin soon the construction of its line to connect Rockport, Aransas Pass, Navy City, Port San Antonio, and to and over Shell Bank and Harbor Island. The company has obtained franchises for use of the streets in Rockport and in Aransas Pass. Charles F. Hoff, Rockport, president. [E. R. J., Nov. 15, '10.]

Ogden (Utah) Rapid Transit Company.—Plans are being considered by this company to build an extension of its Canyon line into Huntsville. It is expected to extend this line later through Eden and Liberty and over the divide into Cache Valley south of Logan. It is also stated that this company will extend its Brigham City line into the western part of Boxelder County and into Malad, Idaho.

Yakima Valley Transportation Company, North Yakima, Wash.—Work will be begun at once by this company on its extension into the Selah Valley. The contract for the bridge across the river, the rock work and grading has been awarded to W. L. Tibbles, Spokane.

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—Work has been begun by this company on its depot in Burbank.

Keokuk Electric Railway & Power Company, Keokuk, Ia.—This company is planning to build a union depot in Keokuk.

United Railways & Electric Company, Baltimore, Md.—This company has been asked to build a station on its Baltimore and Sparrows Point branch between Dundalk Station and Turners Station.

Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y.—This company plans to build a passenger station on Williams Street in Lyons.

Montreal & Southern Counties Railway, Montreal, Que.—New bids have been called by this company to build new carhouses and offices, etc., in St. Lambert. The structure will be two stories, 205 ft. x 85 ft., and of brick, concrete and steel construction.

Fairmont & Clarksburg Traction Company, Fairmont, W. Va.—This company has completed and opened for traffic its new freight station in Fairmont. [E. R. J., Oct. 21, '11.]

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—A temporary station has been built by this company at Second Street and Franklin Street, in Milwaukee, and the company will erect a new depot there early in the summer.

POWER HOUSES AND SUBSTATIONS

Cairo & St. Louis Railroad, Cairo, Ill.—This company advises that during the next few weeks it will award contracts to build an addition to its power house, doubling its capacity.

Chicago, Ottawa & Peoria Railway, La Salle, Ill.—This company will build an auxiliary steam power plant of 2,000-kw capacity at Ottawa.

Massachusetts Northern Railways, Greenfield, Mass.—This company has increased the capacity of its Athol power house by replacing its 225-hp engine with a new 500-hp engine of the reciprocating type. This new engine is direct-connected with a new 550-volt General Electric generator.

Hattiesburg (Miss.) Traction Company.—This company plans the installation of a duplicate motor-generator set at its power house in the near future.

Long Island Railroad, Long Island City, N. Y.—It is reported that this company is considering plans to build a new substation and power house at Cedarhurst in the near future.

Sand Springs Interurban Railway, Tulsa, Okla.—This company has awarded the contract to build its power plant.

London & Northwestern Railway, London, Ont.—This company is preparing plans for a dam and power plant to be built at Rock Glen, near Arkona, in connection with a railway to be built to that point. Smith, Kerry & Chace, engineers, of Toronto, will have charge of the construction. D. A. Stewart, London, Ont., is interested. [E. R. J., Dec. 1, '11.]

Portland Railway, Light & Power Company, Portland, Ore.—This company has installed the third unit at the Estacada plant, thus increasing the output 18,000 hp.

Montreal & Southern Counties Railway, Montreal, Que.—Bids are being asked by this company for the construction of a new substation in St. Lambert. The structure will be two stories, 85 ft. x 60 ft. and of concrete, brick and steel construction. W. B. Powell, general manager.

Manufactures and Supplies

ROLLING STOCK

Montgomery (Ala.) Traction Company has ordered six Brill 21-E trucks from The J. G. Brill Company.

Cincinnati, Newport & Covington Railway, Covington, Ky., is in the market for fifteen single-end cars.

Montreal (Que.) Steel Railway has ordered ten steel car bodies from the Canadian Car & Foundry Company.

Omaha & Council Bluffs Street Railway, Omaha, Neb., is planning to build twenty-five cars in its own shops.

Valdosta (Ga.) Street Railway expects to purchase two new or second-hand single-truck motor cars, one open and one closed.

Connecticut Valley Street Railway, Greenfield, Mass., has purchased one express car body from the Wason Manufacturing Company.

San Benito & Rio Grande Valley Railroad, San Benito, Tex., has ordered two five-bench open cars from the American Car Company.

Pittsburgh (Pa.) Railways has decided to contract for 200 steel cars in connection with the extensive rehabilitation work which it plans to carry out.

Washington Railway & Electric Company, Washington, D. C., is said to be in the market for sixty cars to replace those which were destroyed by fire recently.

New York (N. Y.) Railways has ordered one special motor car body, one steel underframe and two Brill No. 22 special trunks from The J. G. Brill Company.

Rome Railway & Light Company, Rome, Ga., has ordered two 20-ft. 8-in. closed vestibule motor car bodies mounted on Brill 21-E trucks from The J. G. Brill Company.

Toledo Railways & Light Company, Toledo, Ohio, has issued specifications for twenty double-truck, single-end, semi-convertible cars to be 42 ft. 1 in. over bumpers.

Minneapolis, St. Paul, Rochester & Dubuque Traction Company, Minneapolis, Minn., has ordered two steel car bodies and four trucks from the Wason Manufacturing Company.

Dallas Southern Traction Company, Dallas, Tex., has ordered seven pairs of Brill 27-MCB-2 trucks with rolled steel wheels from The J. G. Brill Company through the Stone & Webster Engineering Corporation, Boston, Mass.

Cleveland (Ohio) Railway, reported as having ordered 100 trailers from the G. C. Kuhlman Car Company, has specified that the car bodies shall be 48 ft. long, 8 ft. 2 in. wide, with longitudinal seats, drop sash, center vestibule, steel to window sill and special Brill trucks, with 22-in. wheels and 4-ft. 4-in. wheelbase.

Philadelphia (Pa.) Rapid Transit Company has included the following details in the specifications for the 500 near-side cars ordered from The J. G. Brill Company:

Seating capacity.....54	Air brakes.....G. E.
Weight (car body only), 18,000 lb.	Bumpers .....Brill
Bolster centers, length, 24 ft. 6 in.	Curtain material, Brill Pantasote
Length of body..34 ft. 1⅜ in.	Wheelguards .....HB
Length over vestibule, 45 ft. 2 in.	Gongs .....Dedenda
Width over sills..7 ft. 7¾ in.	Journal boxes.....Brill
Width over posts.7 ft. 11¾ in.	Motors .....West. 306
Height, rail to sills, 2 ft. 6¾ in.	Motors .....outside-hung
Body .....steel	Registers .....Dayton
Interior trim.oxidized bronze	Seats .....Winner
Roof .....plain arch	Seating material, Brill woven cane
Underframe .....steel	Springs .....Brill
	Trucks.....Brill No. 39-E

TRADE NOTES

Nachod Signal Company, Philadelphia, Pa., has moved its executive offices from 929 Chestnut Street to 214 South Twelfth Street, Philadelphia.

Lorain Steel Company, Johnstown, Pa., has appointed Staats J. Cotsworth, of its Chicago office, as sales agent for the Philadelphia territory, to succeed Frank J. Drake, deceased.

Railway Steel Spring Company, New York, N. Y., has appointed Samuel T. Fulton its general sales agent with office in New York. Mr. Fulton was formerly Western manager of the company with headquarters in Chicago.

J. E. Coonan, New York, N. Y., announces that the business formerly carried on by the firm of James H. Denton & Company, New York, has been taken over by him, J. H. Denton having assigned his interest in the business to Mr. Coonan.

General Electric Company, Schenectady, N. Y., has transferred Chester Jones, who has been connected with the signal accessory department since 1910, to the Chicago office of the company. In his new position Mr. Jones will be associated with A. I. Totten and will be connected with the sale of supplies and small apparatus which the company manufactures for railroads, specializing in the signal accessories.

James Rowland Bibbins, Chicago, Ill., has recently established offices in the Hewes Building, San Francisco, Cal., for Bion J. Arnold, consulting engineer, of Chicago, as engineer in charge of a comprehensive investigation of traction necessities and development in the city, upon which Mr. Arnold has been commissioned by the Board of Supervisors to report in the near future. Mr. Bibbins comes to this work directly from a similar technical investigation at Providence, R. I., and Pittsburgh, Pa. His home office continues to be 1000 Borland Building, Chicago.

C. H. Wheeler Manufacturing Company, Philadelphia, Pa., has purchased a plot 400 ft. x 150 ft., adjoining its Sedgley Avenue property, on which it will erect an additional machine shop, to be equipped with 30-ton and 10-ton overhead cranes, electric hoists and electric-driven machine tools. The increased facilities are due to the rapidly increasing business with Wheeler high vacuum condensers, pumps and feed-water heaters, involving demands upon the company's present plant beyond its capacity. These improvements will increase the output of the plant by 50 per cent and should be completed by next September.

Bemis Car Truck Company, Springfield, Mass., has elected W. L. Boyer president and treasurer and E. G. Ward secretary. For the past five years Mr. Boyer has been connected with the American Brake Shoe & Foundry Company. Previously he was for several years superintendent of the New York Car & Truck Company, manufacturer of the Peckham trucks, at Kingston, N. Y. The Bemis Car Truck Company has recently been reorganized and is now prepared to build all types of Bemis and Peckham trucks and also trucks to specifications designed to meet special conditions of service. It also deals in wheels and axles, trucks and motor bearings, gears and pinions, springs, steel-malleable gray iron castings, brake heads and repair parts for Bemis and Peckham trucks.

Thomas W. Casey, general manager of the Prepayment Car Sales Company, New York, N. Y., has recently returned from a trip through Great Britain and the Continent in the interest of the International P-A-Y-E Tramcar Company, Limited, of London, England. Mr. Casey reports a cordial reception among European electric railway officials and great interest in and willingness to discuss prepayment car operation as judged from the experience of the operation of this type of cars in the United States. The General Omnibus Company of London, England, is at the present time changing some buses to prepayment operation. If these should prove practicable and successful a general conversion of all its buses is contemplated. The General Omnibus Company of Paris, France, is also changing some of its buses operating between Paris and St. Germain to prepayment operation.

Allis-Chalmers Company, Milwaukee, Wis., will be reorganized in accordance with a plan just agreed upon following a series of conferences between representatives of committees of bondholders and stockholders which provides for a short voluntary receivership, the substitution of other securities in place of the first mortgage bonds, control of the company for a series of years by voting trustees to be nominated by the present holders of the first mortgage bonds, an assessment on both common and preferred stock, the issue to common and preferred stockholders of new stock in exchange for the old and in compensation for the assessment and the raising of sufficient new money to retire the floating indebtedness and provide the company with ample working capital. The exact amount of the assessment has not been determined upon nor the exact proportion of the new securities to be given to the various classes of security holders.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, is sending to its customers an announcement stating its willingness to send an expert to take measurements on gears and pinions which are being tested and to furnish deductions from such measurements. This company originated this feature in connection with its gear business and has been pursuing this policy for several years, but mostly with nearby companies. It is now arranging to enlarge the scope and cover any railway which desires information. It is found very helpful to the electric railways to have measurements of this sort taken and tabulated for their accurate information. The Tool Steel Gear & Pinion Company has recently come into possession of some interesting statistics as to the wear of different types of gears and pinions on a large city railway. The tests taken by this company were with eighteen double-truck cars equipped with thirteen different grades of pinions and three different grades of gears, covering all grades, furnished by six large gear manufacturers. In the test of pinions the company reports that the efficiency of the other pinions compared with those supplied by the Tool Steel Gear & Pinion Company varied between 1 to 6 and 1 to 10¾. The efficiency of the two other types of gears as compared with those manufactured by the Tool Steel Gear & Pinion varied between 1 to 9½ and 1 to 10⅛.

ADVERTISING LITERATURE

Vixen Tool Company, Philadelphia, Pa., has issued Bulletin B on Vixen files. Attention is also called to the Vixen rail planer.

SKF Ball Bearing Company, New York, N. Y., has issued a 16-page bulletin in which SKF single and double thrust ball bearings are described and illustrated.

Wheeler Condenser & Engineering Company, Carteret, N. J., has issued a 16-page catalog which describes briefly the condensing apparatus which it manufactures.

Pittsburgh Reinforcing Pole Company, Pittsburgh, Pa., has issued a catalog which is devoted to a complete description of pole reinforcing by the Orr patent process.

Hayes Track Appliance Company, Richmond, Ind., is mailing a circular which illustrates a Hayes derail installed on the Lake Shore & Michigan Southern Railroad.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has issued a booklet in which its various types of combination-phones are described and illustrated.

Delta-Star Electric Company, Chicago, Ill., has issued a new 12-page bulletin describing its automatic and non-automatic types of train connectors designed for use in car lighting.

Stone & Webster Engineering Corporation, Boston, Mass., has printed a booklet which contains an account of the construction of the Houserlake Dam. The article is illustrated with many special views.

Pyrene Manufacturing Company, New York, N. Y., is mailing a booklet which is devoted to a description of the Pyrene fire extinguisher. Several illustrations are presented showing tests made with these extinguishers.

General Railway Signal Company, Rochester, N. Y., has issued under date of January, 1912, Catalog G, No. 2, covering its model 2 electric interlocking machine, and Catalog H, No. 1 covering its model 2A signal assemblies and accessories.

Kilby Frog & Switch Company, Birmingham, Ala., has issued Catalog No. 6 for 1912, in which its complete line of frogs, switches, railroad crossings and special work for steam and street railways is listed and illustrated. The catalog contains 154 pages and is bound in cloth.

Lord Manufacturing Company, New York, N. Y., has issued Bulletin O, which describes and illustrates its air cleaner manufactured under Spencer patents, known as the Spencer air cleaner. This device is used on all forms of compressors, ventilating and indirect heating systems.